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ABSTRACT

Ninety-five papers from an international conference on improving university teaching are presented. Topics, which relate to the theme of the conference, "The Social Dimensions and Demands of Teaching and Technology," include the following: computer-based teaching and information exchange, the usefulness and cost-effectiveness of computer-assisted instruction, effective university teaching as perceived by students and teachers, special opportunities and problems of adult learning, the teaching of values and ethics, student reactions to self-paced instruction, remedial teaching approaches, student evaluation of faculty, techniques and programs that help relate theory to practice, research predicting student achievement, professional development for faculty and administrators, developing students' communication and thinking skills, microcomputers for teachers and teaching, using educational technology to improve teaching, and evaluating students' success in probelm analysis and solution. (SW)

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Improving University Teaching

II

Contributed Papers

Ninth International Conference

July 6-9, 1983
Dublin, Ireland

Under the auspices of
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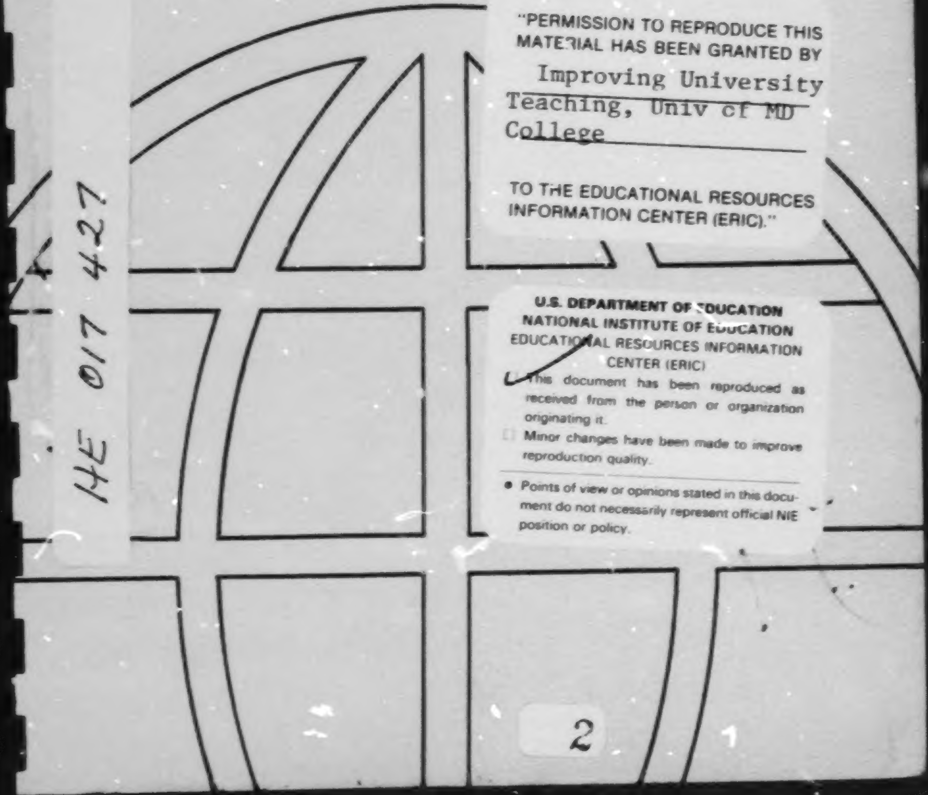

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CONTRACT GRADING AND ITS EFFECTS ON STUDENT EVALUATION OF TEACHERS

by

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INTRODUCTION

For many generations, institutions of higher learning have enjoyed a favorable position with the public at large and the bodies of their elected representatives. However, during the past two decades, this attitude of trust toward our institutions of higher education has changed. Certainly, universities are feeling the effects of the trend toward greater accountability, which iplies a new emphasis on evaluation for all aspects of the institution, including the individual faculty member.

Evaluation of teacher effectiveness serves at least four purposes: (a) to enhance self-development on the part of the instructor; (b) to provide criteria for salary, promotion, and tenure decisions; (c) for public dissemination such as required for student counseling; and (d) to investigate the underlying foundations of "good teaching" and to help in the understanding, predicting, and controlling of the teaching process (1,4).

Assuming that some manner of faculty evaluation is inevitable, attention then turns to the issue of whether or not student evaluation of teaching (SET) should be a part of the total faculty evaluation package. A survey of AACSB schools shows that over 78% of the respondents utilize SET scores for evaluation of faculty (3). Much of the controversy surrounding SET stems from the fact that, despite almost fifty years of research on the subject, the findings are often highly contradictory and generalizations are tentative, at best. The difficulty seems to lie in the problems inherent in the learning process wherein teaching effectiveness is not a unitary concept but one involving a myriad of complex interactions. The literature suggests that the variables influencing teaching effectiveness are similarly complex and interactive but can best be examined when divided into categories: (a) teacher characteristics and behavior; (b) student characteristics and behavior; (c) subject matter; (d) institutional and environmental variables; and (e) community variables (5).

THE PROBLEM

Some educators contend that students are the ultimate consumers of the teacher's efforts, and they should know best whether the teacher has been effective or not. They may not be trained judges of the suitability of their mentor's methods, but students can judge whether or not the course had value for them. Other educators oppose SET because they insist that such evaluation is often distorted and unreliable, a position supported by much of the research noted above (2). Many resist SET on the grounds that they precipitate "popularity contests" and delimit specific attempts on the part of professors to address some of the classroom problems that need corrective measures. In this regard, some faculty personnel feel caught between the need to implement innovative teaching techniques designed to meet the escalating demands of higher education without adversely affecting their SET scores. In other words, a classroom technique that might strengthen the learning experience may not be attempted for fear that student reaction could conceivably result in lower evaluation scores for the professor. That is, when in doubt, don't rock the boat--don't innovate!

The purpose of this study is to measure the effects on SET scores resulting from such an innovative teaching device contract grading, implemented to motivate student performance.

METHODOLOGY

Sample

The sample for this study consisted of six identical classes taught by the same professor at a major university during one academic year. In five of these classes, the professor consistently applied the same teaching techniques and conventional grading practices. In the sixth class, the professor instituted contract grading as a motivator to stimulate student performance. The experimental contract grading class consisted of 35 students while the five control classes consisted of 37, 34, 31, 26, and 19 students for a total of 147 students in the control group.

Contract Grading Method

The grade contract provided the student with a choice in selecting his/her learning activities and desired grade level. Each student could choose among contracts for an A, B, or C. No provision was made for a D contract due to the negative nature of the grade and the research evidence that the D grade has become increasingly uncommon and non-functional (6). The higher the grade level, the higher were the contract requirements with respect to both the quantity and quality of student assignments in the areas of examinations, special research projects, and routine homework. Satisfactory performance in terms of the contract would result in the achievement of the desired grade objective. Students were allowed to raise their contract levels during the semester, providing proper assignments were satisfactorily completed. An element of uncertainty, intended to further motivate performance, was introduced as follows: (a) no contract level could be lowered once the commitment was made; (b) failure to complete the assigned quantity of work would result in automatic failure; (c) inability on the part of a C contract student to perform the quality of work for the C contract would result in automatic failure; (d) inability on the part of a B contract student to perform B quality work would result in an automatic D grade, provided he completed all the work required; (e) inability on the part of an A contract student to produce A quality work would result in an automatic C grade, provided he completed the quantity of work required. That is, if a student contracted for an A but consistently produced B quality, he could receive no more than a C for his efforts. Moreover, failure to complete all of the contracted assignments would result in a grade of F. In this manner, the student could perceive an added ingredient of decision-making under uncertainty in the formulation of the grade contract. It was hoped that this risk situation would stimulate higher performance levels. During the last week of class, students in each class completed the standard faculty evaluation questionnaire utilized throughout the college.

RESULTS

Statistical analysis consisted of t-tests to identify significant differences in response means between the experimental group and the control group. It is interesting to note that the contract grading class earned course grades that were significantly higher ($p=<.005$) than the grades earned by another class in the same subject taught at the same time under the same conditions, but using conventional grading practices. It is also interesting to note that class size failed to impact the SET scores in this study. The t-tests of the student response means from the SET questionnaires are presented in Table 1.

Table 1

COMPARISON OF STUDENT RESPONSE MEANS

EVALUATION	Student Response Means		t Significance
	Contract Grading (n = 35)	Conventional Grading (n = 147)	
Amount of work required in the course.	3.371	3.214	NS
Class attendance (on 5.0 scale).	4.500	4.794	.02
Grade expected in course (on 4.0 scale).	2.857	3.124	.04
Does grade reflect performance?	1.571	1.175	.006
Instructor's impartiality in grading.	3.464	3.577	NS
Instructor's willingness to help students.	4.000	4.402	.01
Textbook rating.	2.643	2.814	NS
Do outside assignments contribute to course?	3.357	3.557	.01
Correlation of classroom work and course objectives.	3.464	4.412	.001
Was course meaningful?	3.429	4.217	.001
Students freedom to express ideas.	3.821	4.273	.005
Instructor's knowledge of material.	3.964	4.557	.001
Instructor's ability to communicate material.	3.964	4.443	.002
Instructor's rating.	4.000	4.495	.001
Overall evaluation.	3.810	4.333	.001

Amount of Work - Students in the contract grading situation perceived a higher workload imposed by the course than students using conventional grading, although the difference was found not to be significant.

Class Attendance - The contract group reported a significantly poorer (p = <.2) classroom attendance than the control groups.

Grade Expected - Despite the fact that the contract student was given the opportunity to select the grade level of his choice and he knew precisely what was required in order to achieve that grade, the risk factor inherent in the contract arrangement is reflected by the finding that contract students expected grades that were significantly below the expectations of the control groups (p = <.04). This result is contrary to the usual argument that contract grade students expect higher grades.

Performance - Students under contract perceived their grade as being significantly lower (p = <.006) than their performance warranted. That is, they perceived the amount of effort required to be disproportionately high in comparison to their grade expectations.

Impartiality in Grading - Students in the conventional grading classes perceived the professor as being more impartial in grading than the students in the contract situation, although the difference was not found to be significant.

Student Help - Students receiving traditional grading reported the professor to be significantly more willing to help students who express difficulty in the course (p = <.01).

Textbook - Contract students assigned lower (although not significanlty lower) ratings when evaluating the course textbook.

Outside Assignments - Students in the contract group gave lower (not significant) scores to the contribution to the course on the part of outside assignments.

Course Objectives - Students under contract perceived the correlation between classroom activities and course objectives to be significantly lower than did the control group students ($p = <.001$).

Meaningful Course - When asked how meaningful the course had been, the conventional grading group response was significantly higher ($p = <.001$) than that of the contract group.

Freedom - Students under contract perceived a significanlty smaller ($p = <.005$) degree of freedom to express ideas and ask questions relevant to the class.

Instructor's Knowledge - Conventional grading students perceived the instructor's knowledge of the material to be significantly greater ($p = <.001$).

Instructor's Ability to Communicate Material - Contracting students reported significantly lower ($p = <.002$) scores with respect to the instructor's ability to communicate course material to the students.

Instructor's Rating - When asked, "All things considered, how do you rate this instructor?" Students under contract assigned significantly lower ratings ($p = <.001$).

Overall Evaluation - The questionnaire scoring procedure also produced an overall evaluation index that is used by the administration as a general indicator of the instructor's teaching ability. Contract grading students gave the instructor an overall rating that was significantly ($p = <.001$) below that of the control groups.

SUMMARY

Space limitations preclude a complete analysis of the findings, however, it is obvious that, although contract grading can improve the learning process, it can result in students' reactions that have a negative impact on the students' evaluation of the teacher as a part of the evaluation process of teachers. Teachers must be alert to the adverse effects on student evaluations that result from innovative techniques designed to facilitate learning.

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CLASSROOM EVALUATION AND ATTITUDES TOWARD HIGHER EDUCATION

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In a study conducted by the present authors it was shown that course evaluation is possitively related to (a) students' and instructors' own and perceived attitudes toward higher education and methods of teaching; and (b) congruence between students' and instructors' own and perceived attitudes. Clearly, an association between attitudes and course evaluation was established, but the question as to which of these, attitudes or course evaluation, comes first, remained open. Do attitudes and attitudinal attributions lead to evaluations consistent with them, or do evaluations have certain attitudinal implications? Which has the causal priority, attitudes or evaluations?

To obtain answers to these questions, the present study resorts to a cross-lagged panel design (Kenny, 1973) that involves the administration of attitude and rating measures at two points in time. The design builds on a comparison of correlation coefficients paired in reversed sequences. The use of a repeated-measures design allows for the incorporation of additional questions that have not always received the attention they deserve: First, what, if any, changes in course evaluation occur between the early and late stages of the course? Next, is there any early relation between evaluations and attitudes, and what becomes of this relation toward the end of the course? Actually, the central issue of causal order is embedded in a configuration of concerns that includes the stability of and relation between educational attitudes and course evaluation.

Method

Instruments. Two Likert-type scales, one of attitudes toward college teaching and one of classroom evaluation ratings, were developed and refined with the aid of expert judges, factor analysis, and several pretests (Hofman & Kremer, 1978, 1980). The attitude scale consists of eight items advocating different methods of instruction, four of them "progressive" and four "traditional". Progressivism and Traditionalism scores were derived by summing and averaging over the appropriate items. Respondents replied to the items twice, once as they reacted themselves, and once as they thought their instructors would react to the same items. This yielded two measures of Progressivism and Traditionalism each, to be referred to as Students' Own and Instructors' Perceived attitudes.

The classroom rating scale has 16 items, all high on a prerotation evaluation factor extracted from a successively refined pool of characteristic course evaluation items. Both the attitude and classroom rating scales have five-step response formats. Internal consistency estimates of reliability in the earlier study were moderate for attitudes (.400-.500) and good for ratings (.800-.900). Students identified selves by the four last digits of their ID number so that questionnaire returns could be matched between Time I and Time II without affecting anonymity.

Samples and Procedure. Three weeks after the beginning of the fall semester the two instruments were administered to 394 students in 22 small courses representative of such courses in the faculties of the humanities, social sciences, and education. Ten weeks later, one week before the end of the semester, the same two instruments were again administered in the same classes to 384 students. Each complete subject record now contained item scores for classroom ratings, Own attitudes, and Instructors' Perceived attitudes. Aside from mean scores for ratings, Progressivism (Own and Perceived), and Traditionalism (Own and Perceived), two congruence scores were computed between the Own and Perceived scores of Progressivism and Traditionalism. The congruence scores are reciprocals of the well-known D statistic summed over the squared differences between Students' Own and Instructors' Perceived Progressivism and Traditionalism, respectively (Osgood, Suci, & Tannenbaum, 1957, p. 91).

Findings

Findings indicate that both the overall mean and the mean for the item that represents a general judgment of the instructor's performance, are practically unchanged: The overall mean is 3.89 at Time I and 3.90 at Time II. The equivalent means for the summary item are 4.16 and 4.15. There are only two statistically significant changes, both for the worse, showing some disillusionment with the quality of lectures and the respect shown to students. These negative changes are balanced by a large number of positive, though non-significant changes.

As far as attitudes are concerned even greater stability was established. Neither the difference between subscales of Progressivism and Traditionalism nor that between individual item means attains conventional levels of significance. Attitudes, Students' Own or Instructors' Perceived, simply do not change from Time I to Time II.

On both occasions of assessment Progressivism means are highter than Traditionalism means, a matter of consistent recurrence since Kerlinger's (1958) early work on educational attitudes. That of course could mean that these subjects are more progressive than traditionalist, but it is also possible that progressivism is contaminated with social desirability. This second possibility becomes plausible if one considers the fact that Traditionalism differentiates between Own and Perceived attitudes (Time I: t=3.35, Time II: t=4.04), while Progressivism does not (t=-1.28, 1.46), and that measures of Traditionalism are more reliable than those of Progressivism, as will be seen below. If it is in fact social desirability that has elevated Progressivism means, lower differentiation and reliability could be concomitant phenomena.

The stability across time of ratings and attitudes is paralleled by the stability of the relation between them, as multiple regression results indicate. The fact that ratings are taken as the criterion regressed on attitude subscales is a matter of convenience and does not detract from the correlational nature of the data on which multiple regression is based. Three weeks after the beginning of the semester, the amount of ratings variance explained by the attitude subscales is almost as high (.208) as it is in the thirteenth week (.218), one week before the end of the semester. When ratings are regressed on individual attitude items rather than on subscales of attitudes, explained variance rises to .218 at Time I and .225 at Time II.

When ratings are regressed on individual items, it is again progressive items that take up the most variance and are the first to enter the equation. Prediction is dominated by progressive content, mainly as attributed to instructors.

In sum, the relation between classroom ratings and attitudes is well established by the third week of the course, that is after four to five meetings, and changes little during the following weeks. This, however, has as yet no implications for causal order, evidence for which will be sought in the comparison of cross-correlations to be reported next.

Employing Cronbach's alphas, coefficients of internal consistency we found that classroom ratings have the highest alphas, .94 on both occasions. Traditionalism subscales are next, varying between .56 and .58 at Time I and .53 and .68 at Time II. Progressivism subscales are the least reliable, .42 and .54 at Time I and .45 and .56 at Time II. Instructors' Perceived measures are always more reliable than the corresponding Students' Own measures. For coefficients of stability the picture is similar: classroom ratings (r = .69) are the most stable. As to correlations between equivalent measures at Time I and Time II they indicate that Traditionalism subscales are more stable than those of Progressivism (.51 and .57 vs. .37 and .45). Again, the Perceived measures exhibit higher coefficients than the Own ones.

Of focal interest are the correlations between attitudes at Time I and ratings at Time II as compared with attitudes at Time II and ratings at Time I. Here one notes that two of the former, but none of the latter attain conventional levels of significance: Ratings at Time II have low, but significant correlations with Students' Own Traditionalism (.20) and Instructors' Perceived Progressivism (.23). Thus, there is some correlation between later ratings and earlier attitudes, but none between earlier ratings and later attitudes.

One more feature is of interest: Correlation coefficients within Time II x II are slightly, but consistently higher than the ones in within Time I x I for all equivalent values. What this suggests, in conjunction with findings reported earlier, is that coalescence among measures, non-trivial from the start, increases somewhat toward the end of the semester.

Discussion

Present findings tend to support the claim that educational attitudes, as part of a class of "personal" variables, successfully vie with "situational" ones, mainly instructor's performance, to account for variance in course evaluation (Hofman & Kremer, 1980). The assessment of ratings and attitudes, students' own and instructors' perceived, at two points in time, replicated previous results and extended them to the issue of causal order.

Somewhat unexpectedly, the association of attitudes and ratings is almost at full strength by the third week of the average course sampled. Further coalescence, as shown in a slight rise of the criterion variance accounted for (from .208 to .218) and intercorrelations of measures at Time II, is very modest. Students appear to make up their minds early in the course about their own attitudes, the instructor's performance, and the attitudes they attribute to the instructor. Positive ratings are most strongly related to progressivism attributed to instructors, but other systematic positions also go with favorable ratings. *Poorer* ratings, then, are associated with *weaker* attitudes, progressive or traditionalist, students' own or instructors' perceived.

The stability of attitudes and evaluations, on the one hand, and the relation between them, on the other, presages the relative indeterminateness of what comes first, attitudes or evaluation. Still, a comparison of cross-correlations suggests that it is the former rather than the latter of these that predominate. While ever so moderate, there is *some* correlation between prior attitudes and later evaluations, but *none* between prior evaluations and later attitudes.

Hence, while there is some basis for regarding attitudes as having causal precedence over evaluations in the college classroom, it would seem more parsimonious to propose a simple model of early balanced coalescence. Given the availability of attitudes toward college teaching at the beginning of any course as well as the speed with which individuals are known to form impressions, a very few exposures to the instructor should suffice to generate a balanced link between attitudes toward college instruction and course evaluation. Perceived attitudes may have the task of mediating that link: What this instructor is doing shows that he/she feels (un)like me about college teaching; therefore, I (don't) like what he/she is doing. In a sense the instructor is judged by what he/she is perceived to believe, and to that extent, evaluation *is* perceived attitudes. This accords with Newcomb's (1958) suggestion that "variations in A's attributions of attitudes to B are systematically associated with variations in A's behavior toward B." (p. 181). The behavior here is evaluation.

Once the student has rated the instructor's classroom performance and anchored those ratings in own and perceived attitudes, a cognitive attitudinal/evaluational structure (or schema) is formed that favors the assimilation of discrepant information, unless it is very discrepant which is unlikely in the predictable environment of the college classroom. In terms of Jones and Goethal's (1972) analysis of earlier research (Festinger, 1964); Jones & Gerard, 1967), once a commitment to certain cognitions, here attitudes and evaluations, has been made, subjects enter a "post-decisional phase in which consistency is of greater importance than accuracy" (p. 43). The early commitment helps to stabilize attitudes, evaluations, and the relation between them.

Does this mean that evaluations, when assessed early in the semester, are different from what they would have been if assessment had been delayed until the end of the semester? Not necessarily, as a comparison with the Hofman & Kremer (1980) findings indicates: There, the one-shot end-of-term assessment yielded findings quite similar to those obtained on the two occasions of the present study. There is no good reason to reject the likelihood that attitudes, evaluation, and the coalescence between them, form early in the semester merely to consolidate further as the term goes on. But the matter bears more specific investigation by a controlled comparison.

If it can indeed be suggested that end-of-term evaluations yield results essentially the same as early-on evaluations, a practical implication is that rating scales can and ought to be administered at an early stage of the semester. This would benefit instructors by allowing for feedback at a time when they can still attempt to change their performance. Indeed, the utility of course ratings would be greately enhanced if instructors were made to feel that they, rather than administrators, were to derive the major benefit from classroom evaluation.

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STUDENT EVALUATION OF FACULTY IN BUSINESS SCHOOLS: A CONTROVERSIAL APPRAISAL TECHNIQUE FOR RETENTION, PROMOTION AND TENURE

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Introduction

Student evaluation of faculty performance has long become a routine practice at most colleges and universities in the United States. In the late 1960's, formal student evaluations became a major input into the appraisal of faculty performances on many campuses (Eble 1972). This trend has continued to expand through the 1970's (Centra 1973; Miller 1974; Blank 1978). Business schools have widely adopted formal student evaluations to document faculty appraisal for retention, promotion, and tenure as early as 1970. The results of a survey of 147 Business Deans inquiring into factors used to evaluate faculty performance indicate that the sources of information have moved substantially in the direction of formal student evaluations and away from administer/colleague opinion as a major input (Seldin 1976). This is further evidenced by Lein and Merz (1978) whose research concluded that more than 2/3 of administrators in business schools use some form of student evaluations for rating faculty teaching performance.

In a survey of Deans representing the AACSB (American Assembly of Collegiate Schools of Business) member schools, Peterson, Kerin, and Martin (1978) reported that student evaluations of faculty, used by business schools, increased from 21 percent in 1966 to 76 percent in 1974. Interestingly enough, other studies have reported that there is an increasing trend among faculty members who favor the use of student input as primary source of information for retention/promotion/tenure decisions (Bayer 1970; Bayer and Dutton 1976; Blank 1978). For example, Enis (1971), in a national survey of marketing professors, reported that 45 percent of those who were asked: "What are your views on mandatory faculty ratings by student" favored faculty evaluation by students, whereas 28 percent opposed such evaluations. Also, in another study, 195 marketing professors were questioned as to what they felt should be the most important source of information for evaluating teaching performance. 59 percent selected student evaluations, while informal comments by colleagues was selected as the second most important source only by 13 percent of respondents (Jolson and Barry 1977).

The purpose of this paper is twofold: First, it is to examine student evaluation of faculty teaching in business schools and its shortcomings as a decision criterion for retention, promotion and tenure. A second purpose is to suggest a guidelines to improve faculty evaluation and its application as an administrative tool in business schools. Specifically, the paper will examine the measurement instruments (rating forms) that are currently used in faculty evaluation. It will also examine the validity of faculty evaluation by students.

Measurement Instrument

Over the years, considerable amount of research has been conducted to determine measures associated with faculty evaluation by students (Costin et al. 1973). These studies in turn have led to the development of a few student rating instruments that have received broad acceptance among colleges and universities. Among the most commonly used evaluation forms are the Student Instructional Report (SIR) developed by the Educational Testing Service in collaboration with Northwestern University, The Student Instructional Rating System (SIRS) developed at Michigan State University and the Purdue rating scale for instructors (Centra 1972; Hildebrand et al. 1971; Michigan State University 1974). While the factors emphasized in these forms somewhat vary, most purport to measure the following dimensions:

1. Student-Instructor Interaction

2. Instructor Teaching Methods
3. Student Interest in Course
4. Challenge or Difficulty of Course
5. Enthusiasm or Expressiveness of the Instructor

These five factors were extracted by factor analyzing a large battery of questions presented to students regarding their assessment of instructors. The questions are randomly listed to eliminate the potential orderbias of rating forms. In most business schools faculty evaluation questionnaires are routinely administered to students toward the conclusion of a course. The results of such evaluations are included, in aggregate scores, in personnel documents and are submitted to the committee in charge of evaluating faculty for retention, promotion, and tenure.

Apparently, college administrators benefit from the student rating of instructors as a ready-made measure of teaching performance. Promotion and tenure decisions are not easy matters as administrators typically evaluate an instructor on three measures of performance: research productivity, teaching and community service. While research productivity and community service can be quantified to a great extent by count, teaching performance is considerably more difficult to measure. By resorting to input from students, administrators try to solve the problem of subjectivity of measurement in teaching performance. They use student ratings without regard to the validity and reliability of such measures.

Teaching, Effectiveness or Showmanship

A question that is often raised by experts is whether student ratings necessarily reflect the instructor's teaching performance and his/her ability to convey knowledge to students. In addition to its earlier use as a guide for teaching improvement, the issue of teaching performance or "teaching effectiveness", as it is more often referred to, has raised a lot of controversy since its use in faculty personnel decisions. The greatest problem with "teaching taught by the instructor."

One criticism about student ratings is the showmanship of certain instructors and its potential impact on teaching effectiveness. Many instructors are convinced that student evaluation of faculty is nothing but a popularity contest in which instructors with ability to entertain and to charm win over students. Painter and Granzin (1972) discovered that (after investigating 27 variables and their influence on student evaluations) to be effective, instructors should make the course as interesting or entertaining as they can.

In a controlled experiment, Barry and Dubinsky (1981) compared the teaching effectiveness of two instructors who used virtually identical teaching methods and who were equally rigorous graders. The results of the experiment revealed that while these two instructors were evaluated identically on 10 of 11 objective teaching criteria, there was a significant difference between them in terms of overall effectiveness. The higher score on the item of "congeniality" indicated that Instructor B was perceived to be friendlier by the students. Therefore one would expect the more congenial instructor to be more popular and admittedly more effective. However, when controlling for "congeniality," the less congenial professor was considered to be more effective by the students.

Criticism has been made about business schools using general rating items in student evaluation of faculty. It is believed that since the content, scope and emphasis of courses widely vary across business disciplines, different measure of teaching effectiveness should be devised. For example, courses in business ethics and business research are both taught in the area of general business (at least in a number of schools), yet they are totally different in terms of content, scope, and application. By its nature, business ethics is a controversial subject that may make its instructor look more expressive, entertaining, understandable, knowledgeable, and congenial. On the other hand, being quantitative, business research can make its instructor look rather dull, rigid, confusing, ineffective, and insensitive. Perhaps, the findings of Kerin et al. (1975) that students regard marketing instructors as being more knowledgeable, more prepared for classes and speaking in clear and more understandable language than instructors in non-marketing classes can be attributed, to some extent, to the palatability of marketing topics rather than to superior teaching by marketing faculty itself.

The Issue of Validity

Regardless, the fact that student ratings make the task of faculty evaluation easy for administrators, real concerns regarding the validity of such ratings still remain. Empirical research tends to cast doubt on the validity of student evaluations. An overriding issue implicit in the research in this area consists of defining what is meant by effective teaching. The ultimate measure of an effective teacher can be his/her ability to enhance learning. But the student evaluation forms currently in use do not measure learning. They rather measure student satisfaction with instructors. Thus, an instructor who receives favorable student evaluations may or may not be effective as measured by student learning.

Extensive research has been done on the validity of student evaluation and the evidence is yet mixed. In a study involving students in an undergraduate calculus class, Rodin and Rodin (1972) found a substantial negative correlation (-.754) between the amount learned by students, based on solving problems (differences in initial ability were controlled) and the teaching effectiveness of instructor as measured by student evaluations. Costin et al. (1973) looked into over 100 studies dealing with the validity of student evaluation of faculty. They concluded that students seem partially capable of rating qualities of teaching; their criteria of evaluation do not appear immature as often charged; there is a positive correlation between administrator/peer evaluation of faculty and student evaluation; instructor popularity may be an index of teaching effectiveness; grades better reflect student interest and motivation in the course than instructor ability. Other studies, however, have showed a positive correlation between grades and student evaluation of faculty. Marks and Molander (1977) measured the amount of learning in students in an introductory marketing course and then correlated this measure with the student evaluation of instructor and the course. Using multiple regression technique, the authors found that student evaluation criteria could explain only 14 percent of the variance in amount learned. In contrast, evaluation criteria explained 54 percent of the variance in perceived student preference ranking of instructors. "Instructor enthusiasm," "how well instructor is liked as an individual," and "instructor style of presentation" accounted for roughly 36 percent of the variance, while characteristics more closely related to teaching ability such as "course organization," "knowledge of student understanding," and "preparation and discussion of recent developments" accounted for about 6 percent of the explained variance. It would appear that satisfaction with instructor in an introductory marketing course is primarily a function of "expressive" than "substantive" factors.

The cited research supports the doubt that student evaluation of faculty provide more useful information about the degree of student satisfaction with instructor than student learning. Yet using the amount learned to validate teaching performance of faculty in business school has its own flaws. As mentioned earlier, measuring learning in students confounds interaction and carry-over effects. Students' grades or test scores probably represent their motivation and commitment to excell than the fine teaching of instructor. Besides, the value of learning (training) will not be realized until student graduates and applies the learned materials in real world situations. Thus, the simple measure of retention and recall of knowledge is but a limited index of learning in business disciplines.

Students Ability to Evaluate

It is argued that students are ill-equipped to evaluate faculty. They have no knowledge of the discipline; they have no clear understanding of the appropriate evaluative criteria to use; they will be influenced by their instructors' personality and grading policies. Although not all these criticisms are always justified, most of them are acknowledged by experts as conditions under which students are asked to evaluate the teaching performance of faculty. As to the depth and currency of instructor's knowledge of his/her discipline, there is an agreement among faculty as well as administrators that students cannot judge the instructor's professional competence. Matters like course syllabi, textbook selection, teaching methods employed should be judged by administrators and other faculty members. They are certainly beyond the capabilities of students. There are yet other aspects of teaching such as skill in presentation, empathy with student's viewpoints, ability to stimulate intellectual curiosity and relating course material to students' experience that students can have a valid judgement on. Enis (1971) defends this position by reasoning that "one need not to be an actor to critically evaluate acting performance, nor a military commander to comment meaningfully on the war in Vietnam, nor a manager to offer constructive criticism of corporate decision making."

Along with the problem of not having the knowledge of the discipline, students may respond to their immediate situation when evaluating faculty. Their ratings can involve criteria that are substantially different from those used by their faculty, thus an instructor can be viewed with regard to the entertainment value of his/her course, the effort required to earn a desired grade, and the relationship between effort required and perceived value of the course material. Fisk reflects his experience on some of students evaluative criteria:

> My experience has shown that the average college student has a rather unique set of evaluative criteria that he or she uses in evaluating professors. The average student wants to read a simple textbook, to hear an entertaining and humorous yet simple lecture, to not have to take notes, to be graded on a curve, to be given easy tests and assignments, to be let out of class early and to have class days cancelled regularly. The average student expects to be allowed unlimited unexcused absences and will then ask, 'Did I miss anything important?' (Fisk 1982; P. 4).

Other potential factors like class size, whether the course is required or elective, level of the course (graduate or undergraduate), and student expectations can confound student ratings of instructors. Student expectations about a course and how these expectations are met have potential implications in faculty evaluation (Canter and Meisels 1971). Students may have preconceptions about a number of aspects of a course such as how much it will contribute to their education or to their future job, how easy the course will be and what grade they should expect to receive. During the course, these expectations may or may not change. Whether they change and the way they change can influence student ratings of faculty. Definitely more focused research is needed to identify the number and extent of confounding factors that may influence and contaminate student evaluation of faculty.

Guidelines to Improve Faculty Evaluation And Its Application in Personnel Decisions

Given the fact that student evaluation of faculty and its use for retention/promotion/tenure decisions in business schools is a norm than an exception, the following guidelines can be drawn to both improve the validity of student evaluations and to justify its application in administrative decision making:

1. More research should be encouraged in the areas of question construction, scaling, reliability and validity of student faculty evaluation. There is need to further understand and define "teaching effectiveness" in business education.

2. Instructors should clearly spell out, in the beginning of the course, what they expect from students and what the students should expect from the course regarding learning, application, grading, etc. This will minimize unrealistic expectations on the part of students and should result in better evaluation of faculty.
3. When reviewing student evaluation of faculty, administrators should recognize the structure and limitations of student judgement. Student rating is not an objective measurement of teaching performance. Its validity is often compromised by such factors as student's lack of knowledge, instructor's personality, and the fuzziness of teaching effectiveness in business disciplines.
4. When reviewing student evaluation of faculty, administrators should use several measures of teaching performance (e.g., preparation, presentation, organization, attitude). Summary measure of student evaluations can conceal instructor's pedagogical ability. In addition, a summary measure does not provide guidance to an instructor to improve his/her teaching competence and consequently student ratings.
5. When reviewing student evaluation of faculty, administrators should compare junior faculty evaluations with senior faculty ratings. Such comparison provides more realistic information for promotion/tenure decision making.
6. When reviewing student evaluation of faculty, administrators should place more emphasis on the evaluations provided by the top students in the class (such students might be identified by their overall GPA). By so doing, administrators would encourage instructors to address their teaching to above-the-average students in order to motivate hard working among students.

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A ROLE PRESCRIPTION STUDENT INSTRUCTOR ANALYSIS FOR

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The use of student evaluations has assumed increasing importance in institutions of higher learning. Where at one time these instruments were used formatively by the instructor to improve course structure and teaching skills, (Nation, LeUnes & Gray 1976) the ratings have found increasing importance in such career decisions as retention, pay and tenure. (Bejar,1975; Chandler,1978; Seldin and Wakin, 1974)

Perhaps the most heavily researched argument in the literature concerning these instruments is their reliability and validity. Also the question of content and an investigation of the influence of the various factors on the ratings themselves has been extensively investigated, often with conflicting and confusing results. Such investigators as Costin,Greenough and Menges 1971; Kulik and McKeachie, 1976; and Ellis and Richard, 1977, have agreed that student evaluations are reliable. On the other hand, Zelby, 1977, argues that they are suspect and should not be seriously considered. Costin et al.,found that the evidence supporting their validity is inconclusive, as did Kulik and Mc Keachie, 1976.

It seems that the difficulty in assessing validity lies in the criterion against which the ratings are evaluated. Most studies have attempted to validate the ratings by correlating them against student achievement. Here the evidence is contradictory. Gessner, 1973; Whitney and Doyle, 1973 found positive correlations between student achievement and the ratings. Rodin and Rodin 1972 found the relationship to be negative. Greenwood

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et al., 1976 found no correlation between these two factors. Thus the validity of the student instructor rating is questionable from the research evidence presented.

There has also been considerable research which has dedicated itself to determining just what factors should be covered by the ratings. The research findings often point to confusing and contradictory conclusions, leading to a considerable variety in the nature of items to which students are requested to respond and also to the organization of the instrument. Kulik and Kulik, 1974, found that most of the factors in various evaluation instruments could be resolved into four basic dimensions: skill, support structure, rapport and overload. However each of these is a complex factor. Skill, for example, seems to be a component of the others, so that even this reduction to basic factors does not lend much guidance to the nature of the items to be used.

The actual attributes which belong in a teacher's rating form vary considerably. Generally these are derived from some statistical analysis scheme which seeks to identify general basic factors. (Lambreth and Kosteski, 1981, offer a typical approach. They abstracted common items from thirty instruments used by large universities, obtaining three hundred items. These were systematically analyzed and reduced to eight clearly defined factors: lecture presentation effectiveness, professor-student relationship, test-readings effectiveness, paper and report effectiveness, laboratory effectiveness, grade point average, prompt feedback.

Of such stuff are the variables made on which students rate instructors. It is interesting to note that even such a rigid treatment produces many diverse basic factors, of which those mentioned above are only a sample. The factors which are used in rating scales seem to follow the same pattern as those in personality assessments which are based on traits. The instruments allege that a personality can be described by the traits, but among themselves none agrees as to what the traits should be. It is interesting to note that the research is, for the most part, silent on one factor which is almost certain to have an effect on a student's response to any rating questionnaire, that of the student's own role prescription of a teacher. In this context a role is the expectations that persons hold in common toward any person who falls in a particular category by virtue of his position in a social system. (Secord & Backman p.457). The key phrase here is the wording "held in common". The basic assumption which underlies the student questionnaires is that all students have a common role prescription for a teacher. This is far from the real situation. Brown, (Brown, p.158) indicates that one type of role conflict can occur when there is little or no consensus among a complementary group which is judging an individual's performance.

This brings up the basis for the instructor rating questionnaires. They are indeed measures of how role behaviors of the instructor differ from the role prescriptions of the student along certain dimensions. In effect the individual rater is evaluating performance on the basis of how it conforms to that rater's role prescription. To distribute a standard questionnaire to a group and then to analyze the answers on the assumption of a common orientation ignores the proposition that each responder

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may have a different viewpoint. That this occurs has been confirmed by informal discussions among students when they are given a task of describing the attributes of an "ideal" teacher. The disparity of views within the group is surprising to say the least.

To summarize: the literature seems to have concerned itself with studies which determine the factors affecting student ratings and the reliability and validity of the instruments. A body of literature does not appear which considers the effects of individual disparities between role prescriptions and perceptions of the instructor's role behaviors. The instrument which was developed and reported on herein represents an effort to use the student ratings to evaluate teacher effectiveness, but in such a way that individual viewpoints are taken into account.

A rating form was created which listed thirteen attributes usually found to be associated with good teaching. These were culled by the author from a survey of various faculty assessment instruments which were reported in the literature. The student was required to sort these attributes into a "normalized" distribution. In making this sort the student was requested to keep in mind an "ideal" teacher, designating the attributes which the student felt were important and unimportant to him in describing this ideal teacher. The student was then asked to sort the same attributes into the same normalized distribution but this sort was to consider the actual instructor, and the attributes were to be sorted on the basis of most to least characteristic. These attributes were then arranged with their first and second sort ranks. A rank order difference correlation was then computed. In addition, the selection of the instructor's characteristics were tallied as most and least characteristic of him.

The correlation provided for a numerical evaluation which was based on the difference between the student's role prescription and the actual role behavior of the instructor. The tallies provided information as to the instructors strengths and weaknesses so far as the majority of students were concerned.

What follows are extracts from an actual evaluation performed by a department head, who used this instrument in order to perform a required evaluation of the author. In order to examine the validity of the instrument he also conducted class discussion-interviews in the classes which evaluated the instructor, covering the students' spoken opinions as to the instructor's effectiveness. Three different courses were used, each of them requiring different preparations and treatment. (Psy 190-Educational Psychology, Psy 280-Abnormal Psychology, and Psy 100 - Psychology of Personal Awareness.)

While the rating form has been in use for almost ten years, this marks the first time it was ever used to satisfy a mandatory evaluation requirement. Therefor the administration procedures were established so as to give the instrument itself a test of reliability and validity. The reliability was tested in two ways. One was the test-retest model in which the students were asked to respond at midsemester and at the end of the semester. Second, the evaluation of three different class's responses, each being taught a different subject, were analyzed to determine if there was a consistent pattern to the group markings. The validity was analyzed subjectively by conducting a third party interview with each class, both at midsemester and semester's end. These were unstructured interviews, given when the rating forms were administered.

Table I summarizes the results of the correlations which were calculated. As can be seen, the correlations are fairly high and all positive, especially those between mid semester and end of semester, which indicates a good reliability. It might be said that the correlations among all classes reflect a rather large difference of opinions among the individual students as to what makes a good teacher. This diversity of views was also found in the interviews, during which it proved impractical to establish a class consensus as the most important attributes an ideal teacher should have. This difference of opinion bears on the group correlation between an ideal teacher's and the actual instructor's attributes. One interesting point is the high correlation between the instructor's actual ratings of midterm and end of semester. Apparently by midsemester the students' perceptions of the instructor have firmed and do not change markedly during the ensuing time.

Table I

Correlations of Ratings

Mid-semester

r. between ideal and actual	.64
r. between ideal PSY190 and PSY100	.94
r. between ideal PSY190 and PSY280	.72
r. between ideal PSY100 and PSY280	.67
r. between actual PSY190 and PSY100	.73
r. between actual PSY190 and PSY280	.78
r. between actual PSY100 and PSY280	.81

End of Semester

r. between ideal and actual	.73
r. between ideal PSY190 and PSY100	.60
r. between ideal PSY190 and PSY280	.46
r. between ideal PSY100 and PSY280	.77
r. between actual PSY190 and PSY100	.68
r. between actual PSY190 and PSY280	.84
r. between actual PSY100 and PSY280	.77

r. between Mid-semester and End of Semester by Class

Ideal PSY190	.85
Ideal PSY100	.66
Ideal PSY280	.72
Actual PSY190	.88
Actual PSY100	.92
Actual PSY280	.91

(Additional data and calculations furnished on request.)

The tally of attributes reveals that the strongest characteristics of the instructor are:

A Knowledge of subject
B Course organization
C Students are aware of requirements
I Evaluates fairly
J Makes course material relevant

The weakest characteristics of the instructor are:

F Does not show interest in students
L Does not provide a positive attitude toward the subject matter
G Does not allow student participation
E Does not show enthusiasm
K Does not promote learning

(These are cited to indicate the sensitivity of the rating form to specific individual strengths and weaknesses.)

The third party interviews and class discussions elicited much of the same information as to the strengths and weaknesses of the instructor. Some areas of concern brought up in these interviews concerned themselves with course structure and procedures rather than instructor behavior, indicating that the format of the questionnaire does confine the ratings to actual instructor characteristics and isolates it from the students' feelings about the course, a factor which has apparently confounded instructor evaluations in other rating systems. (Bock, 1979) The questionnaire does seem to deal with instructor behavior and thus is a valid instrument for evaluating such behavior.

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DEVELOPING A MODEL FOR THE ASSESSMENT OF INDUSTRIAL/PROFESSIONAL PLACEMENT

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Attitudes to the status of vocational education and training fluctuate and change considerably and are influenced by a complex association of diverse factors within any given society. These factors, which have a consequent influence on educational and training policy and practice, reflect the historical, cultural, economic, social and educational milieu of the society in question.

A feature of recent trends in vocational education and training within both the further and higher education sectors of the United Kingdom and the Republic of Ireland has been the inclusion of industrial/professional experience within the course structure. This can only be seen to be innovatory in the scale and breadth of courses which now include such components; within apprenticeship trades, medicing and teaching, for example, practical experience has long been integrated with college-based courses. A variety of models exist for such experience. These include:

(i) a full year out of college, as in the "thick sandwich" model;

(ii) a number of shorter periods of industrial/professional experience the "thin sandwich";

(iii) experience during college long vacations;

(iv) "one-off" introductions to the non-college environment;

(v) regular, one-day a week contact with industry/employers;

(vi) etc.

The benefit to students of such programmes varies considerably. It is dependent on a number of factors including:

- the nature of the placement establishment;
- the extent to which planned work schemes or guidelines are implemented;
- the extent to which work experience is integrated into the overall curriculum;
- the commitment of all those involved, students, college tutors and industrial supervisors, to the programme;

- supervision and training undertaken during placement;
- the extent to which placement is seen to be assessed and certified and, thus, its credibility vis-a-vis other components of the course;
- the nature of this assessment and those involved in the assessment;
- the integration and acceptance of the student into the workforce or team;
- the conditions, including, where appropriate, pay and hours, under which the student operates.

This diversity in contributing factors is reflective of the different rationales behind industrial/professional experience. These include recognition of the need to link theory and practice, to give students a "taste" of the work environment, to enhance employment prospects and aid specific career choice, to give potential employers a tangible stake in courses and to enable them, as well as college teachers, to assess the students' suitability for entry into the profession or industry. This last demands the assessment of performance, the collection of information about a student's competence in the work environment so as to determine his/her suitability for that type of work. This paper considers the development of an effective and flexible model for involving and training all supervisory personnel in the assessment of placement. The model is still in the development stage and some approaches to its completion are outlined in case-study form. The experiences and expertise of other conference participants is sought to contribute further to the model and its applications.

PROBLEMS OF ASSESSMENT

The assessment of placement experience is widely acknowledged as a problem. I have discussed this issue at some length elsewhere (Baum, 1982)[1]. Briefly, the problem seems to focus on a number of issues. Assessment of performance is likely to be subjective; it may reflect the particular occasion of assessment rather than normal performance; some assessments may distort actual performance, particularly where the normal context demands a "one to one" situation; there may be problems in achieving consistent assessment, particularly with untrained assessors, the assessment is of a range of behaviours and skills and the assessor is, therefore, determining performance in a variety of complex areas, maybe involving comprehension, manipulation, planning affective, social and ethical skills, As a consequence, there is, frequently, a temptation to assess those aspects which are most readily controlled and quantified (particularly limited skills) and to rely on assessments in a "laboratory" environment, undertaken by college-based personnel. Alternatively, assessment, and particularly grading, of this course component is entirely omitted.

Some examples from the literature indicate how these problems are perceived within different vocational areas. Bassey (1975)[2], in arguing the case agianst literal grades for teaching practice assessment, identifies four main conclusions which can be drawn from the literature in this area.

(i) it is not clear what criteria are employed in assessing teaching practice.

(ii) there is some evidence that the placement itself may affect assessments, the placements vary in their nature and their demands and this will affect the assessments which students receive.

(iii) there is some evidence that factors other than teaching performance may affect assessment.

(iv) there is evidence that the predictive value of teaching practice assessment is limited.

Bassey's discussion focused on the grading of performance; however, similar conclusions are valid in relation to the overall assessment of placements; in relation to social work, Davies (1979)[3] sees the main issue as the inability of those responsible for training to fail students on fieldwork placement - this he sees not as a recognition of the capabilities of all the students but of the frailties of the assessment system.

" Failing people is not nice - especially if, as a social work teacher, your days are spent thinking about and teaching the courses and effects of failure in general and, even more especially if you are close to the object of your decision, as most social work teachers are close to their students "[4]

This issue is one of a number referred to by Morrell (1980)[5] as central to the assessment of fieldwork placements in social work. The question of responsibility for the planning and assessment of placements is another question posed. Morrell argues that common sense suggests a combination of teachers, college, validating body in co-operation with placement supervisors. But the onus cannot be placed too strongly on the latter because, as Butler (1979)[6] points out, " they are, after all, people not part of or accountable in any way to the student's own institution ". Morrell refers to a number of writers who have serious misgivings about the capacity of fieldwork teachers to carry a major responsibility for assessment and suggests that, while responsibility must ultimately be with course staff and validating agencies, fieldwork teachers are in urgent need of training support. Morrell's final concern is for clarification of the precise qualities and skills which are to be assessed and the criteria for such assessment. He rejects standardised assessment guides in favour of a flexible and negotiated schedule, combining the perceptions and requirements of college teachers, students and fieldwork supervisors, with an emphasis on both descriptive and quantitive techniques. This view is in accord with that of Saunders and Saunders (1981)[7] in teacher education who involved school teachers, tutors and students in identifying the criteria and procedures for assessment. Their work is eclectic and recognises the need for differing approaches and emphasis within each main subject area.

TOWARDS A SOLUTION

A partial solution to this issue seems to be represented in the approach adopted by Saunders and Saunders as well as in recognition of Morrell's arguments in favour of training support for supervisors. At the same time, it must be recognised that industrial/professional supervisors may well be deficient in the training and assessment skills which their college counterparts take for granted. The case studies which follow illustrate various responses to these problems in different disciplines, at different levels and within courses which adopt different models of placement.

CASE STUDY I - An intensive course in training and evaluation

The CSQW is a two year initial professional qualification for social workers in the United Kingdom which includes block fieldwork experience during both years. Fieldwork supervisors are frequently selected because of the specialist case-loads rather than because of particular supervisory, instructional or assessment skills they may possess. To remedy this potential deficiency, the author collaborated with one college department to run an intensive three day course for supervisors. This course has been described in some detail elsewhere (Baum 1979)[8]. The course was intended to better equip the group as teachers, evaluators/assessors by involving them directly and continually in both activities. In particular, the latter role of evaluator/assessor was stressed as a natural extension to similar processes in which the supervisors engage, professionally and socially. The activities include self-evaluation, assessment of each course component and its course leaders and comparison of expectations with perceptions. It was apparent that the course achieved its objectives in developing "evaluation awareness" in participants and subsequent follow-up by college tutors indicated both more effective supervision/training and a greater commitment and effectiveness in assessing placement.

CASE STUDY II - An advanced theory and assessment course

The problems for occupational therapy professional placement are, by and large, similar to those described in relation to social work, above.[9] This fact, combined with the recent upgrading of the occupational therapy course from diploma to degree, prompted the development of a combined theory and assessment course for placement supervisors in a polytechnic. The author contributed to the development and teaching of the latter component. The course was short but intensive. All participants were diplomates from the institution and it is intended that the course should be the first step towards upgrading their qualification to graduate level. The theory, therefore, was intended to contribute to this aim.

In terms of assessment, the course objectives centred on the need to transfer the everyday and detailed assessment skills used by the occupational therapist with her or his patients, to the student on placement. Although the skills of observation and judgement were shown to be very similar, the transfer was by no means automatic and was sought in the classroom situation through role-play exercises, simulation and the use of video recording. One major barrier was identified, particularly among young supervisors. Being relatively recent graduates of the same course as that on which their supervisors were enrolled, there was a tendency to identify closely with the student and to adopt a position not entirely consistent with that of assessor and partner with the college teachers. This problem was faced during role-play and discussion on the course and, subsequently, has resulted in pre-placement discussions and planning by college tutor, supervisor and student working together to clarify the details and objectives of the professional placement.

CASE STUDY III - Setting the Objectives for placement

A frequent problem with industrial and professional placement in many subjects is a failure to identify both the objectives for the placements and the criteria for its assessment. A Human Communications degree in a polytechnic includes a two week placement with a wide variety of agencies in industry, ranging from government bodies, broadcasting and other media organisations, advertising agencies and voluntary concerns. The objectives and criteria for assessment for each student, therefore, must be placement specific because they are allocated very different work, according to the needs and commitments of the placement agency.

The procedure through which placement objectives and criteria for assessment are identified begins with contact, initially telephone but followed by a meeting, between a placement tutor and the proposed agency supervisor. The initial task is to identify a feasible and useful project, both to the student and the agency. This is then refined and defined into a realistic exercise for the two week period and relevant resources are allocated. During the term prior to the placement the students receive a practical programme, designed to equip them with a range of relevant skills and knowledge for the placement. Once students have been matched with agencies, the preparation becomes more specific and individualised so that the student will be able to meet the demands of her or his project. Introductory visits are undertaken to the agency and these culminate in a meeting between the college tutor, the agency supervisor and the student at which precise objectives and practical details of the project are clarified. This is also the time at which the criteria and the mechanics of the assessment are negotiated, with the three parties agreeing a detailed assessment contract. This usually consists of an assessment report by the supervisor, with student responses, and a completed, frequently multi-media, project, which is assessed by the college tutor in consultation with the supervisor. This, relatively detailed procedure ensures that the brief placement period is used to maximum benefit for both student and agency and that all parties are entirely clear, regarding all aspects of the assessment.

CASE STUDY IV - Developing an Instructor Training Programme

Within craft and industrial training programmes, the placement supervisor's role shifts towards that of a skills instructor. Training is an important responsibility within industry, independent of commitments to college-based programmes. Within the hotel, catering and tourism industry in Ireland, CERT, the industrial training board responsible for these industries, organises a Modular Supervisor and Instructor Development Programme,[10] designed to assist industry supervisors in their in-company supervisory and training responsibilities. The programme is not designed specifically to support industrial placement from the college-based craft courses which CERT currently certifies or plans to certify. The seven day programme covers three main components - advanced technical skills, supervisory skills and instructor training to meet the particular standards and requirements of the establishment. As it stands, this programme would be of significant benefit to industry supervisors who are responsible for implementing CERT's various work experience programmes. These require development and instruction in a range of specified skills areas. They are, however, limited in the extent to which they require systematic assessment of trainees. The development of the Instructor Training Programme to include comprehensive skills and attitude assessment and the availability of this programme to all industry supervisors could result in co-operative (between industry, colleges and CERT), meaningful and credible assessment of a central feature of CERT's craft training courses. This development is still embryonic but is one which could provide an additional link towards a viable and effective strategy for the assessment of placement.

CONCLUDING REMARKS

The purpose of this paper has been to outline a number of features of a model for the effective assessment of professional/industrial placement, primarily seeking to involve placement supervisors, college personnel and students in co-operative placement programme and assessment. A realistic goal for this model is for placement supervisors generally to adopt the training and assessment responsibilities which are implicit in the German apprenticeship Meister scheme, as outlined by Flower and Russell (1982)[11]. Conference participants are invited to contribute ideas and suggestions for the further development of the model through use of the pro-forma[12] which is available to confenence participants and which illustrates the current status of the model.

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1. Baum, T : The Assessment of Professional Placements Edapt 1/8,1982.
2. Lassey, M : The Case against Literal Grades for Teaching Practice Assessment, Trent Polytechnic, 1975.
3. Davies, M : Fieldwork Failures - a very rare breed, Community Care, Nos. 282, 283, 284, 1979.
4. ibid.
5. Morell, E : Student Assessment Where Are We Now? British Journal of Social Work, 10/4,1980.
6. Butler, B : Who needs fieldwork training? Community Care, 282, 1979.
7. Saunders E and Saunders C : The Assessment of Teaching Practice, Ulster Polytechnic, 1981.
8. Baum, T : Student feedback on teaching case studies from part-time Courses, Bulletin of Educational Research, No. 18, 1979.
9. The profession's concert for this area is represented in a number of papers. For example:

   Barr, E.M. : A Study of Clinical Practice, Occupational Therapy, December 1980.

   Watt, E : Teaching in the Clinical Setting, Occupational Therapy, October 1981.
10. CERT : Supervisor and Instructor Development Programme, CERT, Dublin 1982.
11. Flower, F and Russell, R : The Industrial Tutor in the Federal Republic of Germany. Studies in Vocational Education and Training in the Federal Republic of Germany, No. 4, Coombe Lodge, 1982.
12. This pro-forma will be available for use by all conference participants.

AN APPRAISAL OF UNDERGRADUATE BUSINESS EDUCATION

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The purpose of this paper is to identify and bring together a number of different perspectives connected with the origins and operation of present sandwich degree courses in business studies approved by the Council for National Academic Awards (CNAA) in the U.K. I should add that although I am a member of the Undergraduate and Postgraduate Courses Boards of the CNAA, the views expressed are entirely my own and not those of the CNAA.

Historically the impetus for the development of the business studies degree came from the deliberations of the Crick Committee. The Crick formula for curriculum development in business studies consisted of Economics, Sociology and Mathematics, disciplines capable of "being interpreted, applied and extended" in a business context and reinforced by law and accounting with the emphasis on "relevance to business problems" (Crick, 1964). The early degree courses in business studies gave prominence to analysis stemming from discrete disciplinary perspectives. In more recent times this emphasis has been somewhat diluted. For example, syndicate groups attending the Department of Education and Science (DES) Conference (1981) on 'Business Studies in the 1980s' expressed dissatisfaction with the Crick formula as a model for business studies degrees, and though they found it difficult to detect any current philosophy in relation to business studies, they detected a move towards the study of business as an entity rather than a set of related studies. A move towards the integration of subjects particularly in the latter stages of degree courses was also noted, and the influence of the Business Education Council (BEC) in this context was acknowledged. BEC is an agency, unlike the CNAA, which prescribes themes and exercises greater control over the determination of curricula at sub-degree level in business studies, and it tends to reject the narrow subject-based disciplines.

The syndicate groups attending the DES conference also felt that undergraduate business studies courses are concerned with education for business, e.g. the culture of business, the ways in which decisions are framed; and that the effect of the Crick model and the influence of the CNAA has been to produce an overly academic and discipline-based approach. Therefore, it is necessary to focus on employers' foreseeable needs and actively involve industrialists in curriculum change. In the CNAA Working Party Report on Business Education (1981) there is evidence of a movement from a strictly disciplinary perspective to a course embracing a greater focus on functional studies and integrative disciplinary perspectives, with an emphasis on vocational relevance, practical utility and analysis of business problems. The need to avoid 'academic drift' is mentioned because of the predominant 'value system' which prevails in the institutions (CNAA,1981). One of the central facets of a philosophy of business education is the sandwich principle. Employers generally view the placement in industry in a favourable light, and use it as a source of recruitment. At a conference held at Balls Park, Hatfield Polytechnic in 1979, the industrialists who spoke supported the sandwich principle. On the basis of a survey investigation, Vaughan (1981) suggests that the sandwich part of the degree seems to be considered valuable by industry, and that a business studies degree without it could be unfavourably compared with other academic programmes.

In the CNAA Working Party report on business education discernible shifts in emphasis were found in the main disciplines comprising the business studies degree. Insufficient application of Economics to business problems has been acknowledged (Lee, 1981; Hyman 1980). The position of Sociology is recognised as being problematic (Brown and Harrison, 1980); on the one hand there are protests against managerial bias and on the other students tend to demand relevance in terms of applying the discipline to business problems. Psychology, by contrast, appears to have a low profile in terms of ideological significance, but Organisational Behaviour and Behavioural Science appear to be on the ascendency because of a discernible orientation towards techniques and applied perspectives. Alan-Smith (1981) recognises that behavioural science has made a decisive contribution to the students analytic capability in appreciating human relationships at work. The pure Accounting content, in terms of time spent on it, has been reduced, but Accounting manifests itself in other areas of the business studies course, such as Corporate Planning or Business Decision-making. A movement towards interdisciplinarity based on a decision-making focus can be detected. A noticeable shift in Accounting itself is the use of accounting information for decision-making and the development of greater academic sophistication. There is also evidence to suggest that the accounting input to the business studies degree is not as relevant as it ought to be (Bull, 1981).

There appears to be a problem with the teaching of Quantitative Methods as a discrete input to the business studies degree. Bannister and Massingham (1980) feel that it tends to be taught in the abstract with the emphasis on learning a technique at the cost of ignoring problems of application, and that there has been a failure to integrate Quantitative Methods with other subjects, such as Accounting, Marketing and Behavioural Studies, on a business studies course. Though it is only fair to point out that, due to curriculum developments promoted by BEC and the relevant professional bodies, increasingly a more applied perspective is adopted in this subject as an entity on its own, or as a subset of another area of study (e.g. Finance). Marketing seems to be a developing and emerging area of study, and according to Evans and Piercy (1980) it is currently fashionable to stress the vocational nature of marketing education. In the business studies degree courses surveyed, there tended to be a natural concern for the applied aspects of marketing, though the study of export and international marketing was somewhat neglected.

It is sometimes suggested that there is no study of business as such in business education; what we have is a number of academic subjects that many believe to be relevant without the benefit of an objective assessment of the needs of business (Hyman, 1980). According to Tolley (1981) business studies amounts to a bundle of basic disciplines brought together in an inter-disciplinary setting without sufficient attention given to the analysis of systems, and there tends to be an over-emphasis on Economics and Finance to the detriment of technological change. However, it was concluded in the CNAA Working Party report on business education that there was a movement away from conventional disciplines in a strict sense and towards the integration of disciplines with an emphasis on application. There is also a tendency to introduce the functional areas of business at an earlier stage of the course, with perhaps a better connection between disciplinary perspectives at the foundation and intermediate level and functional studies in the final year. On the basis of a survey of interested people from a cross section of the business community, Buttery et al (1981) offer a normative scheme covering the four years of the course, but this is not altogether clear in an operational sense. In the first year, apart from the emphasis on the relevant disciplinary foundation, there would be an 'Introduction to the Business World'. (A similar view was expressed by the syndicate groups at the DES Conference when it was suggested that 'Business as a System' should be introduced early on in the course so as to provide a framework to relate subject areas and 'stimulate creativity and a greater sense of self-propulsion'). The second year would comprise a study of the functional aspects of organisations with a stress on overall goals. The placement period in the third year would stress the importance of relating knowledge to practical situations. The fourth year would emphasise a depth treatment of the final year specialisms, with the distinctive characteristic of consolidating previously accumulated knowledge and offering a final integrating experience. The above prescriptive approach to undergraduate business education has been resisted by the CNAA and according to Stoddart (1981) a pluralistic approach to curriculum design is preferable. However, the vocationalism of business studies degrees is becoming more marked, and in recent years there has been a growth in specialisms offered. This development is linked to the growth in importance of certain professional bodies (e.g. Institute of Personnel Management and the Institute of Marketing), who emulate the attitudes of the accounting profession. Given the changing orientation of the business studies degree, the syndicate groups attending the DES Conference stressed the need to accommodate the rapid change in computing and information systems, as they are applied in practice, on the courses and that more consideration should be given to the development of communication and social skills. This is an area to which greater attention should be given in the future because weaknesses in imparting communication skills have been recognised by business studies graduates (Horner, 1982).

The CNAA Working Party report concluded that there was a problem in integrating the academic and placement experience. Relating theory to practice invariably presents problems and this is not a predicament faced solely by students. The academic teacher of business and management studies has also to grapple with the problem of relating theoretical knowledge to the real world, though this would be less of a problem if the teacher had experience of researching management problems (Binsted, 1981). Integration of subjects or disciplines, or horizontal and vertical integration of different strands of the business studies degree course, is not without difficulty at the operational level. Gore (1981) maintains that there is no consistency in the application of integrative approaches, if anything there is a tendency for 'horizontal chaos' and 'confused progression' to occur. The view of the Inspectorate at the DES Conference was that there was a weakness in subject progression. In the CNAA Working Party report on business education, it was stated that there were difficulties in achieving academically sound and vocationally-relevant integration of the earlier and later years of the business studies degree course. Though one acknowledges these criticisms, it should be stated that progress on integration has been good given the resource constraints and the commitments by staff to individual subjects.

It was felt by those attending the DES Conference that a number of issues relevant to the teaching and learning process warranted close scrutiny and attention. These include the interactive processes in the classroom, the frequency of feedback, evidence of wide reading, the use of the placement experience as an input to the fourth year studies, the use of self-teaching methods in subjects such as Quantitative Methods, Accounting and Computing, and the need to develop a problem-centred mentality in Economics and Sociology. The development of skills, firmly anchored in an academic framework, is likely to become an increasingly important process in undergraduate business education, and in this connection business educators could benefit from a closer examination and acceptance of some of the processes used in Art and Design education.

The importance of work practice has been emphasised in the Finniston (1980) Report, and supervised work practice as an integral part of the sandwich degree course in business studies receives wide acceptance. There is a belief that certain important benefits flow from the sandwich course system; for example, it promotes closer integration of theory and practice, it has a positive impact on the students motivational disposition and sense of responsibility, it crystallises his career plans and gives him valuable experience of organisational life (Daniels, 1981).

According to Harrison and Vaughan (1980) a number of minor and major benefits accrue from the sandwich principle. The minor benefits are said to be the ability to apply learning to real problems, greater confidence and a recognition of the usefulness of the course. The major benefits include the experience of having worked with people on real problems, deriving an insight into the workings of industry and commerce, and time to reflect on different job opportunities. However, the industrial placement does not always live up to the expectations of the students, though the expectation of acquiring practical experience is met (Horner, 1982). Apparently students fail to experience a strong link between the academic content of the business studies degree and the sandwich component (Daniel and Pugh, 1975). Students are not always fortunate enough to secure a good placement, and as a consequence they are denied an enriched experience. Bedeman (1979), an industrialist, suggests that if the approach to the deployment of the students' abilities is skilful and professional, the sandwich concept can be successful. He identified prior identification of tasks to be performed, involvement in the life of the organisation as a normal member of staff, and a job that stretches the student as factors contributing to a successful sandwich experience. It is probably true to say that the economic recession has made a significant adverse impact on the availability and quality of the industrial placement at the present time.

A desirable outcome of the business studies course is the blending of relevant knowledge and practical experience. This overall process contributes to cognitive development, as well as the enhancement of interpersonal and communication skills, in the better programmes. It would appear that those characteristics are valued by business (Vaughan, 1981; Hodson, 1979). Unfortunately, the relationship between business educators and practitioners is said to be less than adequate (Cannon, 1981). Since academics in business education are not required to have a continuing link with the practice of business, it is not surprising that there is a weak link between the educational process and practice. One way to rectify this alleged deficiency is to encourage secondments to business and the development of in-house training courses. Joint staff-student research activity, aimed at business, and the provision of a consultancy service could be an alternative mode of liaison with business (Hyman, 1980). Steps could be taken to encourage the involvement of industrialists in curriculum design and in providing more purposeful inputs to the on-going educational process. Hodson (1979), an industrialist, feels that business might be interested to provide practising managers for occasional lectures, but the success of such a venture as an integral part of the course would depend on the willingness of the colleges to accommodate such an input.

In conclusion a number of observations can now be made, some bordering on proposals. Over the years a departure from a strict Crick interpretation is evident, but this departure has taken place against a background of uncoordinated influence, reflecting differentiation in emphasis within disciplines and courses. We have always had to face the problem of selecting topics to be covered within a discipline on a multi-disciplinary course, such as business studies, where depth of treatment has to be sacrificed to some extent because of considerations connected with width of coverage. Given the trends identified earlier in this paper on the role of the disciplines, and acknowledging the need to be selective in the choice of material, it could be of some benefit if key concepts or principles in the different disciplines were specified. These could then become the necessary underpinning for a serious study of the functional areas of business and the other integrative subjects on the degree course in business studies.

It also seems necessary to place greater emphasis on the development of social and communication skills as an important feature of the degree course, since industry places value on inter-personal and communication skills that can be operationalised fairly quickly. Likewise, the scope and potential for applying theory to practice should be pursued more vigorously. The sandwich principle should be retained, even though it is generally acknowledged that the industrial placement experience does not always live up to the students' expectations. However, it does offer the opportunity to acquire practical experience. Though we need to know more about industry's educational needs, it seems that industry is interested in the skills already referred to, the breadth of the educational experience in cognitive terms, and the students orientation towards a career in business.

Interaction with industry could go beyond the pursuit of conventional applied research and consultancy and embrace joint staff/student investigative activity; this could be complemented by the creation of profiles of the characteristics of different industries. Also, some form of secondment to industry should become a common occurrence. A more formal input from industrialists, which would be incorporated as an integral part of the course, could be beneficial. The ideal visiting lecturer from industry would be one attached to a specialism in business with an interest in the educational process and is prepared to contribute to curriculum development in an informed manner.

A serious review of teaching and learning strategies is called for; this should focus on both educational technology - in particular resource-based processes in micro-computing - and the quality of the dynamic interaction between the lecturer and student. It is likely that benefits could be derived from studying those aspects of the teaching and learning processes in undergraduate art and design education that could be transposed to business education.

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MARFLEET STEEL: DEVELOPING A "LIVING" CASE STUDY FOR MANAGEMENT EDUCATION

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The following paper represents a brief outline of Marfleet Steel, a case study which we prepared for use with post-graduate, post-experience management students [but have used with undergraduate business and secretarial students]. We began with the general aim of bridging the gap between classroom learning and experience-based action research and role-playing to produce an organic and responsive simulation, a "living" case study with a high level of organisational reality. We can here only briefly outline the wealth of material comprising the case and its theoretical background, but we will make this material available on request.

Aims of the case

We began with a group of students who were having difficulty in integrating education and practical experience; in developing their intuitive skills as managers; in relaxing common sense and/or dogmatic assumptions about the activities of management, in relating their personal values to their work ethics; and in handling a range of information, particularly of a qualitative nature, without distortions or presumptions which seriously inhibited their problem-solving abilities.

With the above in mind our specific aims were :

1. To provide a case study with high 'content' [task related] and 'process' [interaction-based], 'reality', [with 'environmental' reality being low but accountable].
2. To provide an opportunity for students to investigate a case in an ongoing, dynamic way, with live participants from the 'organisation'.
3. To raise real problems of handling information, by presenting it in different ways [verbal, written, briefed, obtained by interview etc.] and to introduce the idea of there being data which is concealed, mistaken, distorted or false.
4. To raise real problems of access to information and respect of confidentiality.
5. To demonstrate the complex nature of organisations, the multiplicity of levels at which they might be analysed, and to demonstrate that 'problems' which at first seemed self-contained might only be aspects of quite different phenomena.
6. To provide a 'controlled failure' experience to indicate to students of considerable experience, who were well-advanced on their course of study, how much more it was possible to achieve [without demotivating them].

7. To give students practice in group work, in sharing perspectives and enriching their perceptions of 'reality', in giving and receiving support, demonstrating and practising consulting skills and negotiating and effecting joint presentations.

Some methodological issues

Verisimilitude

In terms of 'content' realism, we decided to create our company based on one specific company of which we had experience. We included some characters, and problems both human and structural, which we had experienced in three companies, so that every part of the simulation was based on a real situation in a company, though not the same one. Names, dates, and figures were altered to make the original source companies unrecognisable.

'Process' realism we intended to establish by our approach to role-playing, discussed below. The relationships within the groups were managed to give realism as the task was presented to them not as a 'work' task but as a consultancy assignment they were called on to perform as students. This was a likely project, and was similar in nature both to a project they had already attempted as groups, and one which they would have to conduct in the future as individuals.

'Environmental' realism was not possible to obtain in terms of working in the company itself, but we were concerned that there should be a sound reason for us being where we were. We therefore created a set of circumstances and correspondence in which the Personnel Manager of Marfleet Steel Company contacted the Head of the College's Management Centre, asking his advice on third party consultants who might review the company's graduate recruitment and training scheme. The Head suggested that some postgraduate management students might contribute their service as part of their project work, and towards this end the Personnel Manager arranged for members of his company to meet the students on their residential weekend, where they would have plenty of time to discuss the case and relax afterwards.

Role Playing

From the beginning, we decided that the degree of 'process' reality which we wished to achieve would only be attained by extending and elaborating the notion of role playing as conceived in other attempts at similarly staged case studies, or educational role plays. Against a thorough background of company information, we wished to create a full character for each role player, with a biography, motivations and relationships in order to ensure complexity without contradictory information [though contradictory relationships were part of the reality of the case]. We wanted to give role players a real part to play, with all the information they needed to get inside a character without fearing that they were improvising in the wrong way. Each role player received an abstract of their employment history, and a 1,000-1,500 word role brief on their personal life, career, relationships, problems, and position with regard to critical arguments in the case. We felt that the result of this was a brief which was fuller, tighter and more atmospheric than is normal in similar role plays, and it thus enabled us both to exert more control over the content of the case, and to give role players all the information which they might expect to know about themselves as people. By issuing copies of all role-briefs to all role players a week in advance of the case, they were enabled to thoroughly familiarise themselves with the other characters, and develop their role conceptions accordingly. This was supported by two verbal briefings and exchanges. The attempt was made in the role briefs to capture the imagination of the role players and, with suitable direction, to produce convincing and imaginative performances. In the event, our expectations of the role players were more than satisfied.

Company information

Information about Marfleet Steel Company and its working environment was provided in both verbal and written forms. Information was presented verbally by role players whilst being interviewed by student investigators. Role players were provided with a complete set of data sheets giving details of company structure and company history, recent financial performance, market research findings and full role briefs for all role players. Role players were authorised to release verbally any information to which they had access, but in accordance with the pertinence and relevance of the questions posed by the student interviewers.

Written information was organised into 3 categories - OPEN, CONTROLLED and RESTRICTED. OPEN information consisted of that which would normally be easily obtainable by anyone researching a company. Typically this might consist of company accounts and brochures, trade association literature, newspaper and magazine articles and entries in buyers and credit guides.

In the Marfleet case OPEN information consisted of the letters setting up the investigation, a summary of company activities, brief company history, an organisation chart showing divisional structure, sales figures, extracted financial information [but not the most recent] and policy statements by Directors. This information was presented to the students in an opening pack of data sheets, not collated as in a typical case study, but as an uncollated set of items. The pack also contained brief biographies of the M.D., Personnel, Finance, Production and Marketing Directors [100 words each]. A breakdown of the structure and activity of the Personnel Department was included together with notes on the Personnel Manager, Training Officer and details of the graduate recruitment scheme. All this information is typical of that which might be provided in a normal case study. Not all such information was made available as open information in the Marfleet case however.

The second category, CONTROLLED information consisted of further information that might normally be considered as open together with some material that might only be available on a 'need-to-know' basis. To facilitate the investigative and multi-perspectival aspects of the case a number of detailed information sheets were prepared and issued to role players. These sheets were available for release to students in response to specific questions meriting a detailed and written response. CONTROLLED sheets however were not issued in response to general questions, especially those searching for 'hand outs' such as, "Is there anything else we ought to have ?!"

The information areas covered by the CONTROLLED sheets included : the most recent financial information in extract form, personnel record summaries of all role players [but only available from the role player himself], indices of industrial production, iron and steel production and consumption, and employees in U.K. employment.

The final category of information was that designated RESTRICTED. This was not available to students in written form under any circumstance. In a typical case study this type of data would only be available in the Teaching Notes. Similarly, in a trading organisation, such information would be restricted, in its written forms at least, to the senior tier of management.

In Marfleet Steel Company, *RESTRICTED* data sheets were only issued to role players, and enabled them to play their role convincingly. Detailed financial information was provided consisting of Profit and Loss Statements and Balance Sheets for the past six years together with a comprehensive set of ratio analyses. Although aimed primarily at the M.D. and Financial Director, all role players received copies of these. Each role player was also given a full set of detailed role briefs, as mentioned above, also classified as *RESTRICTED*.

Managing the case

As we felt it was important to give students freedom to set their own level of analysis, we tended to adopt a posture of 'neutrality'. Information was presented uncollated; role players were available long enough to allow each group three interviews; facilitators were briefed not to coach groups. The groups had their own rooms and facilities, and once the case began were allowed to amass information and develop analyses. Their progress *was* monitored, for we did not want any group to fail completely. Rather than coach to success, we were prepared to control the risk of extreme failure, in order to allow the groups to achieve something whilst failing. At the end of the weekend, groups made a presentation to the Board of role players, followed by an out-of-role debrief. This de-brief led to difficulties for students in adjusting, and the main debrief took place some days later at the College. We attempted here to demonstrate, by example, something of the breadth of analysis possible in the case.

Conclusions

After the debrief each student submitted a write-up of the weekend, and the role players were asked to submit comments on their experience of the case. We used these comments to discuss, amend and revise the case, and stimulate our own thoughts further. In considering whether the case achieved its aims, these comments were invaluable.

As regards the 'reality' of the case, the general view was that it was extremely convincing and absorbing. Role players found that they were able to 'live' their characters and students commented on the superb standard of their performances. This is perhaps the greatest advantage of a 'living' case study in that it becomes so convincing as to make it difficult to stop 'acting' when it ends. Although at first some students attempted to see anomalies as 'mistakes in the case', as the weekend wore on they returned to re-examine these in the light of the realism of the rest of the case.

Problems of information handling were real, and the groups as a whole failed to manage it satisfactorily until shown in the debrief. The disabling need to identify the 'problem' and the 'answer' at an early stage was highlighted, and the necessity of floating tentative answers to be tested to destruction was emphasised. This both increased uncertainty amongst the students but simultaneously offered them a way out. The problems of handling distorted and mistaken or confidential information were heavily underlined, as was the danger of naivete in organisational investigations.

The 'controlled failure' experience worked in so far as none of the groups or individuals performed so badly as to be disillusioned enough to give up - all were caused to face up to their shortcomings and obtained learning from this. The students were left very low and vulnerable after the presentations, however, and the three-day gap to the full debrief was felt, in retrospect, to be essential for them to pick themselves up and lick their wounds.

In demonstrating the complex nature of organisational problems, we felt that although by no means bringing them to a full and sophisticated level of analysis, we were very successful in breaking out of the academic strait-jacket of theories, questions and answers. Although amongst our students there were many who were sceptical of the insights of sociology and organisational behaviour, after the case we received many comments of the order of "that's the way it ought to be taught". The habits of rejection or devaluation of certain forms of academic knowledge were to some extent broken, and advances were made in the direction of the integration of functional knowledge.

In conclusion, we felt that the case was an outstanding success for the students on and for whom we initially developed it, and could usefully be adopted by other groups of managers. The method itself is we feel, worth wider development and application in all areas of management education. Although it is extremely demanding in terms of staff preparation, role playing, and debriefing; in terms of time; and in terms of the effort and intensity required from both staff and students, as a learning event and a stimulus to further learning it would seem to be more than justified. Probably its greatest merit is the considerable strides it takes in the direction of 'reality' and 'experience', in attempting with some success to bridge the gap between the claustrophobia of the classroom case study and the powerful but organisationally problematic action-based learning project.

AN ALTERNATIVE TO SERVICE DELIVERY:
A TEACHING MODULE ON VOLUNTEERISM

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In characterizing social services, the 1960's were called the decade of growth and the 70's the decade of accountability. If one could forecast the remaining years of the 80's, given the pattern of the first two years, this decade might be dubbed the decade of resourcefulness. Lean, austere, bare-bones, these are a few of the adjectives applied to describe the 1982-83 budgets of social service agencies throughout the country. Business as usual is no longer a possibility as agencies not only encounter continued inflation, but a 25% reduction in federal funding in 1982 (Block grant approach, 1981) and as much as a 34% reduction between 1982-1986 (Humphreys, 1981).

It is obvious to educators in human services/social work that traditional modes of social services are no longer applicable to maintain standards of quality in a time of economic scarcity. Suggestions being discussed in the literature and by social welfare administrators include such procedures as tightening eligibility requirements to reduce client enrollment, abandoning preventive principles and returning to strictly rehabilitative services, or determining who should be helped by adopting the military concept of triage (Edelwich and Brodsky, 1980). A far less radical option, an option that would maintain or possibly even increase and enrich services, is the effective utilization of volunteers. This is not a new idea, but certainly one which needs further development and implementation in the United States.

According to the characteristics adopted by the Council for Standards in Human Service Education, the primary educational objective of Human Service/Mental Health Programs is "to prepare human service practitioners to serve clients to carry out other supportive human service agency functions" (Handbook, 1980). The Council on Social Work Education (1982) also indicates that a graduate from an accredited baccalaureate program possesses the knowledge and skills to organize and provide resources on behalf of clients. To address these standards, it is imperative that these programs expose their students to the effective utilization of volunteers as a service delivery resource. In addition to understanding volunteers as an available resource, effective practice also requires utilization skills. The authors propose a module in the practice sequence that provides an opportunity to develop skills and a knowledge base, and to examine their personal experiences and reactions to volunteerism.

The impetus for suggesting this module has emanated from the authors' research of volunteerism in England.* This country, like the United States, is experiencing an era of limited funding for social services that cannot keep pace with human needs. To narrow the gap, service deliverers as well as government spokespersons have and are continuing to stress an increased use of volunteers as a partial solution for the economic problems of the 80's (Fulcher, 1977; Humble, 1982). This recent study investigated the recruitment, screening, training, utilization, and evaluation of volunteers in a number of agencies in Greater London. While conducting this research, which included a number of personal interviews and a survey analysis, the authors concluded that there are distinctive British facets of volunteerism that suggest reforms for the United States. Another conclusion is that organizations, agencies, and in particular, professional helpers play a significant role in enabling people to become effective volunteers. These research conclusions, current service needs, and the scant attention directed toward volunteerism in the current practice sequence controlled the shaping of the module's overall objectives.

* This research was made possible by a 1982 Faculty Development Grant from The University of Tennessee, Knoxville.

Designed as the last teaching unit offered within a two-course practice sequence, the "volunteer module" is four weeks in length with approximately 16 hours of class time. Additionally, a major assignment, students volunteering in human services agencies, lasts the entire two-course sequence (20 weeks). These classes are basically seminars intended to discuss content areas, test attitudes, express feelings and further develop skills. The overall modular objectives are the following:

- to introduce an alternative to the delivery of social services;
- to prepare future helping practitioners to effectively work with and utilize volunteers; and
- to acquaint students with the unique facets of British volunteerism and to focus on the value of learning from others.

What do students need to learn to attain these goals? Given the highly controversial nature of the topic which necessitates the development of a personal framework, the complementary aspects of information and experiential learning are emphasized. For purposes of this discussion, we will present separately these two components knowing in reality that they are intertwined (see Figure 1).

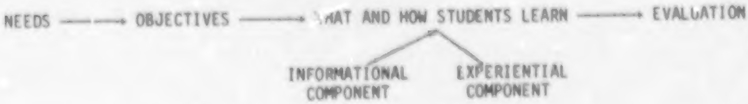

Figure 1. Instructional Design.

Informational Component

The informational component of the module consists of an overview of the development and the implementation of volunteerism in a changing society. Students are exposed to this material through outside reading from a prepared bibliography, guest speakers, lectures, a review of case studies, and a program analysis assignment. The class as a whole participates in these activities with the exception of the program analysis. Each student, participating as a volunteer, examines his/her own program utilizing the common components model (LaCour, 1976). The results are recorded, handed in to the instructor, and shared with the class. Through these various learning methods, students acquire information which becomes the basis for class discussion. The following list specifies some of the topics discussed within the four week period. This list is not inclusive, but it reflects the essential content of the module.

1. Definitions of significant terms related to volunteerism (i.e., voluntary, volunteer, statutory, formal-informal services)
2. Historical context of volunteerism
3. Implications for service delivery
4. Common components of volunteer programs
5. British volunteerism and its applicability to the United States
6. Relationship between volunteers and professionals
7. Needs of volunteers
8. Necessary skills to work with volunteers

Facets of British Volunteerism

As listed above, one specific content area is British volunteerism and its applicability to the United States. This is a pertinent area for the following reasons. Historically, the United States has been influenced through English laws, customs, and procedures. Despite cultural and historical differences, an awareness of the approach England has selected to deal with economic constraints within social services today has immediate relevance to the United States. Additionally, introducing the unique facets of British volunteerism also serves to focus on the value of learning from others.

In analyzing the British approach, there appears to be a strong emphasis on the common components of volunteer programs. Examples of the topics which might be included in this content area based on the authors' research are the following:

- In terms of recruitment, the British emphasize the use of personal contacts; however, a variety of recruitment methods including the use of religious organizations, brochures, and special campaigns increase the possibility of reaching not only more potential volunteers, but also a wider variety.
- Agency administrators value the screening and orientation process for volunteers as well as the training of professional staff for the effective utilization of volunteers.
- Volunteers are involved in direct service delivery and are reimbursed for out-of-pocket expenses. They are supervised and evaluated by paid, full-time coordinators.
- Program evaluation is emphasized to justify the use of volunteers. One method of evaluation is the attempt to follow-up those volunteers who have withdrawn from programs.

Experiential Component

As a module in the practice sequence, primary emphasis is on the effective utilization of volunteers. Thus, the experiences provided encourage students to examine their attitudes and feelings toward volunteerism and to integrate information from class with the realities they face as volunteers.

As mentioned earlier, throughout the practice sequence students participate as volunteers in local agencies. Their experiences and feelings are logged on a regular basis. This experiential activity is designed to bring students into direct contact with realities such as the structure of volunteer programs, the conflict between professionals and volunteers, and the effective delivery of services. This activity not only has applicability to the volunteer module, but also to modules throughout the practice sequence, (i.e., communication skills, values clarification, relationship building, problem-solving, etc). Implementation is not difficult given the need for volunteers in community agencies. Specific to this module, students are also required to prepare a written analysis of the volunteer program in which they are participating. This assignment constitutes one aspect of the evaluation process. In completing this assignment, students utilize their personal logs, interviews, library resources, annual agency reports, and conferences with the instructor. The format for this analysis focuses on the common components model which includes recruitment, screening, orientation, implementation, retention, and evaluation (LaCour, 1976; Lauffer and Gorodezky, 1977). The analysis also addresses related issues concerning who volunteers, the needs of volunteers, funding, and professional resistance.

Integration

There are a variety of in-class activities to further integrate the informational component with the experiential component. It is the instructor's responsibility to locate and select those resources which further facilitate the exploration of values and focus students' attention on the merger of experience and information. These class activities also serve the purpose of broadening students' horizons to differing perspectives by promoting the exchange of ideas and experiences.

Throughout these activities, the development of skills utilized in working with volunteers takes on primary emphasis. In dealing with volunteers, professionals have to exhibit skills in recognizing human motives, relating rewards to motivations, and developing job descriptions. Skills in management (planning, organizing, directing, controlling, and evaluating) and skills in group process (leadership, decision-making, and conflict resolution) enhance the relationship between professionals and volunteers (Haeuser and Schwartz, 1980).

Role playing, debates, problem-solving, and values clarification exercises are suggested activities. For example, students participate in role playing sessions that focus on problems which are often encountered in the development and the implementation of a volunteer program. The following vignette raises questions relating to motives of volunteers as well as the recruitment and screening process.

> Ms. Jones has expressed interest in becoming a volunteer with your agency. In her initial contact with you she expressed a desire to work with people and she feels she can provide some needed services. She has returned a completed application to you. As you are looking over her application, you note Ms. Jones' statement that she feels she would be an effective volunteer. Not being an agency employee, she feels she could determine and provide needed services without the hindrance of agency policies and procedures. You noticed that Ms. Jones has a tendency to talk down to others and know what is best for others.

Given the situation above, the class is divided into small groups to determine a course of action. Class discussion centers on the following issues: 1) What factors influenced your group's decisions? 2) Compare your decision with the decisions made by other groups. 3) What factors would change your decisions? Members of each group are also asked to role play the decision that was made and to share with the class their experiences and feelings after the role play.

A module so heavily invested in experiential learning creates problems in objective evaluation. When a module includes such a subjective issue as the exploration of values with such an objective issue as specific facets of British volunteerism, then evaluation must consist of a variety of approaches. A pretest-posttest as well as the program analysis stress the information component; however, the analysis goes beyond that point and reflects the experiences and reactions of students. The students' logs also provide an indication of personal growth as well as the integration of information and experience. This combination of evaluation methods provides an accurate and appropriate assessment procedure for a module of this nature.

Conclusions

Due to recent cutbacks in social services there is an increased concern about the value of volunteers in service delivery. This module recognizes volunteers as a viable resource and has as its end result the preparation of future practitioners who will have the knowledge and skills to effectively work with and utilize this resource.

There is a concerted effort by the authors to present a model that stresses experiential as well as informational components. Believing that "knowing is a process, not a product" (Bruner, 1969, p.72), the authors identify pertinent knowledge areas not only in lectures and assigned readings, but also provide ample opportunities for students to become actively involved in experiencing these areas firsthand. A concerted effort is also made to design a module that emphasizes individuals learning from each other and from other cultures.

What is furnished is one instructional design for the preparation of future practitioners to work effectively with volunteers. The information and skills presented are relevant to different programs (human services, social work, nursing, etc.) at different levels (A.A., B.A., M.A.). It can also be implemented in a variety of curricular designs; i.e., it may be a module, an entire course, or a prevalent theme throughout a curriculum. This module is not structured to adhere to a specific time frame, rather the key concepts, teaching techniques, learning experiences, and skill development can be adapted to the unique needs of students and programs.

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WRITING FOR A REAL AUDIENCE:
A NEW APPROACH TO LABORATORY REPORTS

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Introduction

In most laboratory courses, students routinely perform experiments to illustrate well-known phenomena and then write reports read by the course instructor, who year after year has waded through virtually identical reports on the same basic concepts. Consequently, most laboratory reports are marginal in content, boring to write, and even more tiresome to read. Although this result is dismaying, it is not surprising. Students generally view the experiments and report writing purely as exercises whose primary purpose is to show how much (or how little) a student has learned. Because the professor knows far more about the assignment than they do, students focus on demonstrating that they deserve a good grade rather than on communicating technical material. Even if the professor stresses that students must write reports for someone who has not conducted the experiment and who needs information from the report, as long as students are merely performing exercises and writing for an artificial audience consisting of the course instructor, their reports are apt to remain seriously flawed in content, organization, focus, and style.

In an attempt to eliminate these problems, the Chemical Engineering Department at West Virginia University has restructured its two-semester, senior-level unit operations laboratory course to provide students with open-ended laboratory assignments and a real audience for their reports.[1] Our primary aim was to help students upgrade their technical communication skills; but, after one year of experience with the revised course (the second semester of the 1981-82 course and the first semester of the 1982-83 course), we have found that this new approach not only has met this goal but has also paid dividends that we had not expected.

Plan for Course Reorganization

We began planning the course reorganization with the assumption that, if we were to teach students to communicate effectively, we would have to give them something worth writing about and someone who was relying on them for the information that they were supposed to communicate. Thus, our laboratory assignments could not simply be exercises designed to demonstrate the validity of long-accepted theories, nor could the sole audience for the reports be a professor who knew more about the investigation than the student writing the report. Because we wanted to train our students for writing in industry, we decided to have students structure reports for an organizational setting, as Mathes and Stevenson suggest,[2] and to give them "real life" problems (e.g., designing an experiment to provide data that could be used in correcting a problem often encountered with a specific process or in designing either a process or an industrial-scale piece of equipment).

We knew that these changes would eliminate some of the "exercise" aspects of the course, but they would still leave us with the problem of a highly artificial audience for the reports, one that was only judging reports rather than trying to learn from them. With some trepidation, we decided that we would increase the number of experiments conducted each semester but have each student only do a few of the experiments (i.e., 3 out of 8 in the spring semester and 3 out of 12 in the fall term rather than the 5 out of 5 that the students had been performing). Then, instead of the instructor alone reading the report, one copy of each report would be read (and graded) by the instructor, and another would be read by two students who had not done the experiment and would not be doing it. These students would read the report for technical content, comment on its clarity, and suggest ways in which it could be improved. Once they had made their margin comments, they would meet with the author of the report, comment on the report orally, and ask for further explanation of any points they did not understand. To motivate students to read the reports carefully and to let the author know when a report was unclear, we decided to give a final examination covering all experiments that were conducted during the semester. In this examination, we would expect students not only to do very well on questions relating to the experiments they had performed but also to be fairly knowledgeable about experiments covered in reports that they had read. Thus, students reading the reports would be relying on them for information they needed and would no doubt let their peers know that they had little patience with ambiguous, vague, disorganized prose.

Modifications to the Plan

We started the spring term by explaining our plan to students and asking for their comments. For the most part, they were very positive about the proposed reorganization, but they had severe reservations about our expecting them to learn technical material from each other's reports, especially since we had made no provision to check the reports for technical accuracy first. As a result of their comments, we decided to require students to turn in their raw data, calculations, graphs, and error analyses in time that they could be graded and returned five days before the written report was due. Thus, students were given the opportunity to rework their analyses if necessary before they wrote their reports. This procedure did not guarantee that all technical material in the report would be correct, but it did reduce the chance that students would be seriously misled by their classmates' reports.

Early in the first semester of the restructured course, we made two other major changes. Rather than have students turn in written reports on all three experiments they conducted, we decided to have them write reports on the first two experiments and give an oral presentation to the entire class on the third experiment. This change exposed students to technical material on experiments that they had neither conducted nor read reports about, allowed those who had performed the experiment or read a report on it a chance to evaluate an alternate approach, and gave students much needed practice in oral communication (an area too often overlooked in college curricula). Because we were reluctant to reduce the writing component of the course for those students most in need of help, we also decided to require any students who had not received a grade of B or better on both written reports to rewrite one of their reports by the end of the term.

Effects of the Real-Audience Approach

As early as the first assignment, we could see definite signs that our real-audience approach, reinforced by the spectre of a final exam covering all experiments, was beginning to pay off. Many of the first reports submitted were clearer, more concise, better focused, and better organized than the reports these same students had turned in at the end of the previous semester. By the second report, nearly all students had greatly improved their writing. (See Appendix for sample passages written before and after the reorganization.)

Although at first students were somewhat reluctant to comment in writing on the weaknesses in their peers' reports (a problem that was significantly reduced when we made it clear that their comments would have no effect on our grading of the reports), they were not at all hesitant to ask the authors for clarification if they did not understand a point. Because we allowed students to leave class once they had read a report, discussed it with the author, and met with the readers of their own report, students quickly began to see the advantage of clear, concise writing that is tailored to the needs of the audience. Considerable peer pressure began to be exerted by those who had to wade through pages of rambling prose or who had to waste time trying to extract meaning from vague, overblown reports. Even students who, in the previous semester, had maintained that any criticism of their writing was more the result of the instructor's being willfully obtuse than of any weakness in their prose were forced to accept that they were not communicating effectively. Through the real-audience approach, we made poor writing their problem, not just ours; and we helped them to recognize that bad writing misinforms.

By the time students got to the oral report (near the end of the semester), they had gained an awareness of audience that many presenters at professional conferences might well envy. Most of the oral presentations were clear, concise, and to the point; and, when they weren't, students in the audience were not shy about asking penetrating questions.

The results of a detailed course evaluation questionnaire completed by students at the end of both semesters indicate that students find the real-audience approach helpful for a variety of reasons. All but two of the sixty-five students responding said that they derived benefit from reading and commenting on each other's reports. Over 60% said that seeing the problems in other students' reports helped them learn how to improve their own writing. Nearly half found their classmates' comments on papers helpful. A similar number felt that having a real audience to write for had a positive effect on the focus and clarity of their reports, and over 75% indicated that they learned technical material from reading classmates' reports.

The final examination, which was designed to motivate students to respond to reports like a real audience, gave us a chance to determine how much technical material students actually had absorbed by reading or listening to each other's reports. Over the two terms that the reorganized course has been in operation, students have averaged 90% correct on questions about the three experiments they had performed and 76% on the experiments on which they had only read classmates' reports or listened to oral presentations. The impressively high score on experiments with which students had no first-hand experience initially made us wonder whether the examination results were more a function of background knowledge than of material learned through reading or listening to other students' reports. But, when a small sample of chemical engineering faculty and graduate students took the exam, they scored less than 25% correct. That this control group, clearly more experienced and more highly educated than the undergraduates in our class, could not answer one fourth of the questions correctly shows that background knowledge cannot account for the high scores students received on questions pertaining to experiments they had not conducted: students had to have learned the material from reading or listening to each other's reports. Thus, even though we reduced the number of experiments that students were required to do from five to three, the technical content of the course has not been diluted. On the contrary, students now gain a greater breadth of technical knowledge than they did before we introduced the real-audience approach.

The real-audience approach has brought with it another unanticipated benefit. Because of it, our students have been forced to begin assuming responsibility for their own education. No longer can they passively rely on the course instructor or the textbook to tell them everything they need to know. Even though we take some precautions to try to prevent students from becoming hopelessly confused by gross technical errors in a fellow student's report (i.e., by giving them feedback on their calculations before they finish writing their reports), we have no way of guaranteeing that all reports are technically correct. And that is just as well. It is important that students be given both the opportunity and the responsibility to evaluate what they read and hear, to check whether it seems reasonable and, if not, to seek a more reliable source of information or work through the problem on their own. They must do more than blindly accept; they must evaluate, criticize, synthesize. Yet, students from many disciplines, engineering included, seldom if ever are required to develop these skills. Too often, they can get by and even be rewarded if they do no more than uncritically accept and accurately regurgitate what their professors tell them and their textbooks say. When they graduate, they are unprepared to continue their education (as college should prepare them to do) because they haven't learned about educating themselves: they haven't had to take responsibility for their own education. And, in spite of their college degrees, they are ill-prepared for the complex society they are entering. In contrast, students exposed to the real-audience approach cannot rely on blind acceptance. Their role cannot be passive. They are forced to think for themselves, evaluate what they read and hear, seek out answers to unresolved questions. And, as they do, they have started to take responsibility for their own education. Although this was not our goal when we decided to provide students with a real audience for their reports, it well may be the most far-reaching result of our efforts.

References

[1] Discipline-specific details of the reorganization are given in "Writing to Instruct: A New Approach to Unit Operations Laboratory Reports" by Patricia H. Whiting and J. Christopher Ludlow, presented at the 1982 Annual Meeting of the American Institute of Chemical Engineers, November 1982. Copies are available from the authors or on microfiche from the American Institute of Chemical Engineers, New York, NY.

[2] Mathes, J. C., and Dwight W. Stevenson, "Completing the Bridge: Report Writing in 'Real Life' Engineering Courses," Engineering Education, November 1976, pp. 154-158.

APPENDIX

Sample Passages Written by an Average Student

Exhibit A: Submitted at the end of the last term before reorganization

INTRODUCTION

In gas absorption a soluble vapor is selectively removed from its mixture with an inert gas by means of a liquid. The washing of ammonia from a mixture of ammonia and air by means of liquid water is an example. A common apparatus used in gas absorption is the packed tower. Such a system has been used in this series of experiments.

In this experiment it was desired to determine whether the gas film or liquid film was limiting to absorption. Also comparisons of experimental results with those in the literature were to be made. Results were analyzed by graphing gas flow rate versus the height of a transfer unit. Also the product of the overall mass transfer coefficient and the interfacial area per unit of packed volume was graphed against gas flow rate at constant liquid flow rate. Similar graphs were made with constant gas flow rate and varying the liquid flow rates.

Exhibit B: Submitted midway through the first term after reorganization

INTRODUCTION

The New York City Department of Public Works is studying the possibility of using a solution of polyethylene oxide and water to increase fire-fighting efficiency. If using the "Poly-Ox" solution is feasible, a new distribution system would be needed separate from the public water supply. This system would consist of elevated holding tanks for the solution connected to a distribution network terminating in traditional fire hydrants. Since polyethylene oxide and water form a non-Newtonian solution, designing such a distribution network requires semi-empirical equations (determined from experiment and theory).

Our task was to formulate an equation to predict the time necessary to drain a holding tank of the "Poly-Ox" solution. Three steps were needed to fulfill this task: deriving a general draining-time equation, determining the relationship between shear stress and shear rate for the solution, and verifying the draining-time equation with experimental data from a small-scale model of the system.

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Systems Complexity, Learning and Adaptation:
Towards An Eco-Dynamic Synthesis

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INTRODUCTION

Social change, precipitated by the forces of evolution and enactment within the boundardes of time and space, has surfaced significant questions of educational purpose and effectiveness. Doubts about the efficacy of learner exposure to discrete units of linear, but specialized education, in order to operate effectively within a dynamic social system are being increasingly voiced. Reisman (1977) states: "we do not yet know what sort of education such a society would find socially useful and individually creative...our ignorance is overwhelming, which makes our claim that we know what to do so preposterous and self-defeating." (p. 32). Dissatisfaction with the entropic state of educational activities have resulted in some soul searching and crystal ball gazing among scholars and practitioners alike. Consensus among informed experts about the future of higher education seems to be anchored in the evolving notion of 'life-long learning' (Glaser, 1977). The dominant philosophy of this notion is the maintenance of the level of human capacities for more effective adaptation to the needs and demands of a complex environment.

The concept of learning and the process of adaptation can best be studied in the context of its social environment. The present environment, as typified by the high technology orientation of the industrially developed societies exhibit certain fundamental characteristics. These are: (1) the ever increasing growth of knowledge and the attendant fragmentation and specialisation of disciplines; (2) social and technological changes that render some occupations and careers obsolete while spawning new ones in shorter and shorter time spans; (3) the increasing age of the population due to decreasing birth rates and advances in the health sciences; and (4) the greater social commitment to equal opportunity and access to all occupations based on one's ability to perform work rather than the criteria of race, sex, social class, etc. Within this context, the "front-loading" of educational experiences in the individual's life space is increasingly questionable. Increasingly, sentiments favoring a continuous process of education and learning, woven throughout the life span, providing timely assistance in mastering the developmental challenges and environmental changes are being heard. O'Toole (1977) states:

> "Flexibility...might complement a broader dismantling of the anachronistic, monolithic, and mechanistic life path that has developed in industrial society. In this rigid path, education is synonymous with youth, work with adulthood, and retirement with old age--thus segmenting lives into age traps and segregating generations into age ghettos...education, work, and leisure should be experienced as continuing strands running throughout each person's life, each strand to be stressed by the individual at the appropriate and desired stage in his or her career." (p. 14).

There are indications that preparatory training in phenotypic job skills is becoming less and less cost effective because of the rapidly changing work environment and changing developmental tasks through one's career. This requires the identification of and preparation for those genotypic adaptation competencies that are suited to the person's career interests, preparing them for continual learning and growth. This paper, utilizing systems theory, attempts to provide a conceptual framework to understand better the mechanisms of learning and adaptation, thus enabling the design of more powerful life long educational programs.

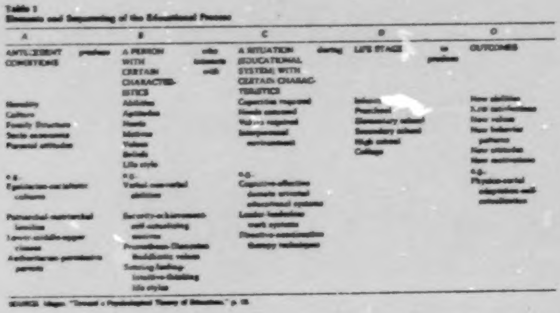
System Complexity and the Learning Process

Any assessment of the complex phenomena of education and learning is better approached by applying a systems framework. Sometime ago, Boulding (1956) proposed a nine level hierarchical scheme for categorizing systems. The adjacent levels in the hierarchy differ in complexity not merely in their degree of diversity of variability, but in the appearance of whole new system properties. The advantage stemming from such a scheme is that it permits the description of qualitative changes in systems complexity. Individuals and groups, in Boulding's conceptualization, would be a level 7 and level 8 system, respectively. As such, they would not only contain characteristics of the lower level systems but that their differentiation and integration mechanisms, as well as its internal process would be qualitatively different and more complex. Movement from one level of system to another would mean that the patterning of data changes, not only quantitatively but also qualitatively. Moreover, in this hairarchical scheme, systems at level 4 and beyond are classified as open systems characterized by their complex adaptive behaviors through active transactions between the system and its environment. Thus, lower level stasis-seeking, closed systems are characteristically quite different from the complex, open systems. For the present purpose, these systems characteristics are important aspects of knowledge.

Learning can be viewed in many ways. As a mechanism of adaptation, learning is a process by which persons recognise elements of their environment as forms of knowledge and choose to exploit that environment through adaptation process (Gish, 1981). In this paper, learning process is perceived as being vested in the [illegible] psycho-social, transactional orientations that endeavour to explain the individual's attempt to attain his fullest potentials (Maslow, 1962; Kluckhohn and Parsons, 1961; Erickson, 1963; Goldstein, 1963; and Jung, 1960). Education is perceived to be the key mechanism through which the individual opens up the lock-gate of his potentialities and begins a journey into growth. Hedegard (1967) states "Learning is a unitary phenomenon involving the whole person as an active agent in the learning process. Ego development, moral development, and capacity for change are interrelated aspects of self growth."

A central goal of higher educational programs is to broaden and develop the perceptual and judgemental functions of individuals. Mogar (1969) postulated that alternate systems of education (particularly the experiential method) would be more appropriate in matching the individual's capacities-needs with environmental demand-opportunities to propel him into an ever expanding course of growth. The theoretical framework of Mogar, presented in Table 1, provides a basis for systematically describing and explaining the elements and sequencing of educational process developmentally at various life stages.

Table 1
Elements and Sequencing of the Educational Process



A		B		C		D		O
ANTECEDENT CONDITIONS	produce	A PERSON WITH CERTAIN CHARACTERISTICS	who interacts with	A SITUATION (EDUCATIONAL SYSTEM) WITH CERTAIN CHARACTERISTICS	during	LIFE STAGE	to produce	OUTCOMES
Heredity Culture Family Structure Socio-economic Personal attitudes		Abilities Aptitudes Needs Motives Values Beliefs Life style		Capacities required Needs satisfied Values required Interpersonal environment		Infancy Preschool Elementary school Secondary school High school College		New abilities [illegible] New values New behavior patterns New attitudes New motivations
e.g. Epicurean-ascetic cultures Patriarchal-matriarchal families Lower-middle-upper classes Authoritarian-permissive parents		e.g. Verbal-nonverbal abilities Security-achievement-self-actualizing motives Promethean-Dionysian-Buddhistic values Sensing-feeling-intuitive-thinking life styles		e.g. Cognitive-affective domain oriented educational systems Leader-leaderless work systems Directive-nondirective therapy techniques				e.g. Physico-social adaptation-self-actualization

SOURCE: Mogar, "Toward a Psychological Theory of Education," p. [illegible]

Mogar attempted to match the perceptual-judgemental styles of the individual with appropriate educational techniques. He posits three approaches to educational process:

(1) the uniformity approach where all individuals are subject to the same educational process

(2) the congruity approach where the individuals with a given life style would be exposed to comparable educational techniques

(3) the complimentary or compensatory approach where the individuals of a given life style would be exposed to techniques opposite to the life style.

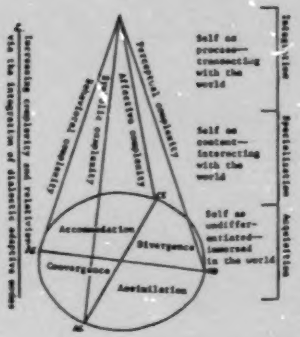
In discussing the impact of these approaches, Mogar states that, under the uniformity approach, the individual differences of perception-judgement and dominant need levels are completely ignored, resulting in a high degree of specialization of cognitive capacities. In contrast, the congruity approach would develop the dominant perception-judgement capabilities (superior functions) at the expense of less accessible potentialities (auxiliary and inferior functions), resulting in a society of diverse specialization with highly specialized but "one-sided" individuals. The compensatory approach, on the other hand, would progressively expose the individual within a given life style to techniques that appeal to their less accessible capacities (auxiliary and inferior functions) resulting in development of latent potentialities. Mogar feels that two generalizations can be made from above conceptualizations: (1) the higher the dominant need level the more receptive an individual would be to complimentary techniques, benefiting maximally from them. Conversely, (2) the lower the dominant need level, the more receptive an individual would be to congruity techniques. Thus, the importance of identifying the dominant need levels of the learners is clearly established and is in keeping with statements made by McLelland (1961) and others about the nature of achievement and growth needs.

Learning and the Process of Development

Kolb's (1974) experiential learning theory is based on structural analysis of the learning process that identifies two basic underlying dialectic dimensions: concrete experience (CE) and abstract conceptualization (AC); and active experimentation (AE) and reflective observation (RO). These two dimensions identify four genotypic adaptive abilities or learning styles in a cyclical pattern that suggests a sequence of learning. Kolb, in describing this four stage model, further hypothesized that learning requires abilities that are polar opposites that force the learner to continually choose the specific set of learning abilities that he will bring to bear in any specific situation. An integrative framework, as proposed by Kolb (1981), linking experiential learning process to the individual's growth and developmental mechanism is presented in Figure 1 below.

In this model, human growth and development is perceived as consisting of three broad stages. The first stage, acquisition, marks the acquisition of basic learning abilities

Figure 2 The Experiential Learning Theory of Growth and Development


Increasing complexity and relativism via the integration of dialectic adaptive modes
Behavioral complexity
Symbolic complexity
Affective complexity
Perceptual complexity
CE
AE
RO
AC
Accommodation
Divergence
Convergence
Assimilation
Self as process—transacting with the world
Self as content—interacting with the world
Self as undifferentiated—immersed in the world
Integration
Specialization
Acquisition

and cognitive structures. In the second stage, specialization, development primarily follows paths that accentuate a particular learning style. Individuals shaped by social, educational, and organizational socialization forces develop increased competence in a specialized mode of adaptation that enables them to master the particular tasks. The third stage, integration, is marked by the reassertion and expression of the non-dominant adaptive modes or learning styles.

Through these three stages, development is marked by increasing complexity and relativism in dealing with the world and one's experience, and by high level integration of the dialectic conflicts between the four primary genotypic adaptive modes of CE, RO, AC, and AE.

Towards a Conceptual Synthesis

So far, the discussions have surfaced some of the relevant theoretical underpinnings for comprehending the complex process of learning and adaptation towards the goal of self-growth. More specifically, Mogar's conceptual framework identifies the systems characteristics of outcome oriented educational process. Also, Kolb's theoretical framework of experiential learning and its linkage to human growth process have been summarized. But the complexity of human and social system adaptive behavior through learning necessitate a broader framework that synchesizes the relevant variables discussed above. Figure 2 representa such an attempt.

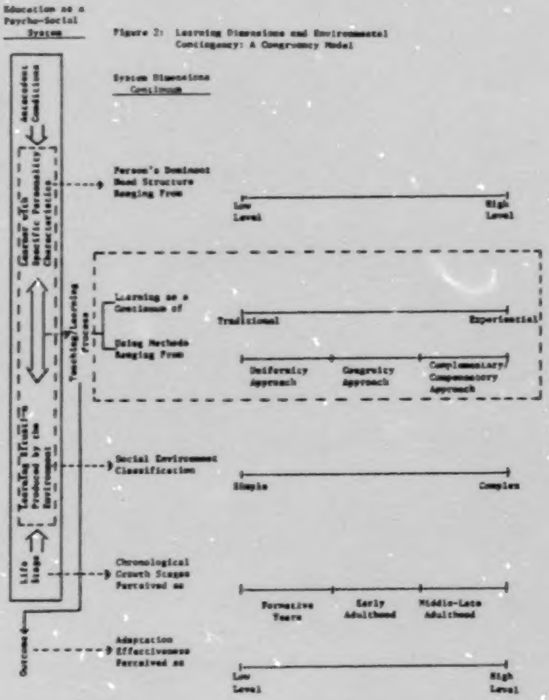


Figure 2: Learning Dimensions and Environmental Contingency: A Congruency Model

Education as a Psycho-Social System
Antecedent Conditions
Learner with Specific Personality Characteristics
Learning Situation Produced by the Environment
Life Stage
Teaching/Learning Process
Outcomes
System Dimensions Continuum
Person's Dominant Need Structure Ranging From
Low Level
High Level
Learning as a Continuum of
Traditional
Experiential
Using Methods Ranging From
Uniformity Approach
Congruity Approach
Complementary/ Compensatory Approach
Social Environment Classification
Simple
Complex
Chronological Growth Stages Perceived as
Formative Years
Early Adulthood
Middle-Late Adulthood
Adaptation Effectiveness Perceived as
Low Level
High Level

The basic assumption made explicit in this model is that the learner is a complex open system and therefore it is impossible to make any sense of one's behavior without taking into account the forces from the environment that interfaces the target system. The concept of adaptation is rooted in the transactions between the person and his environmental context/situation. The dynamic contexts/situations make behavioral/processual demands that, in order to be effective, need to be congruent with the specific contextual elements. Only then can adaption become a meaningful system outcome. Some of theother assumptions implicit in this conceptual synthesis are identified below:

1. Learning is a life-long personal process. Any given course or learning process is but a concentrated segment in the individual's continuing learning and development process.

2. The underlying purpose of any course or learning process is the development and expansion of the competence (personal and professional) of the total person, and not simply the absorption of specific knowledge, facts, and tools.

3. Substantive knowledge, gained by whatever means, is important, but it is incomplete until capabilities for integrating, internalizing, and using the knowledge are achieved.

4a. Internal motivation is necessary for optimal learning. The most effective and lasting learning stems from a "need to know."

4b. The more closely the learning process and environment parallel (simulate) actual practice, the more motivated the learner will become.

5. Responsibility for learning lies in the hands of the learner. The learner must "own" his learning choices and processes.

6. Self-assessment and self-evaluation are of primary importance. Feedback and evaluations by others are secondary but important as checks against broader realities.

7. The most important learning is learning how to learn—through multiple learning methods, but especially how to learn from one's own experience.

The dominant theme of the model of adaptation through learning as presented in Figure 2 is the notion of dimensional congruity. Unless the system variables are in matching configuration, the outcomes will not be achieved. Thus, the model indicates that when the individual's dominant need structure is at the lower end (as witnessed in the formative years), and the environmental context is simple, then application of traditional teaching/learning method using uniformity approach would lead to adptation effectiveness which is perceived as being low. Conversely, when the dominant need structure is high (which is more likely in later adult life), and the environment is complex, then experiential teaching/learning methods using complimentary/compensatory approach would lead to high adaptation effectiveness.

Conclusion

In every society, education is possibly the most future-oriented activity (O'Toole, 1977). Yet, almost all educational activities seem bent on imprinting a specialized learning paradigm upon the young of the society to adapt to current employment skill/knowledge demands. These skill/knowledge demands are at best transient and cyclical, and due to social changes, face a higher degree of obsolescence. Educational endeavours, more suited to the demands of an exponentially changing social environment, need to be harnessed to the goal of developing more adaptive learning profile. This requires an appropriate educational design that integrates the individually dominant need structure, knowledge of learning styles, and life stage to the environmental demands. This paper provides such a conceptual framework through which appropriate educational design considerations may be identified and operationalized.

There are indications that, in the past decades, the attitudes and orientations of learners in industrially developed societies have shifted towards sociocentric and personalistic life styles (Bier, 1969). Therefore, avoidance of future shock would require the consideration of the 'personal cosmology' and possible alteration of such cosmology through explicated processes of experiential learning theory. In the context of epistemological paradoxes that are characteristics of dimly understood higher order open systems, it is just possible that such alterations and adaptations through learning designs may help human societies achieve congruence between the cosmic elements of hui, being, and ming.

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PERSON-CENTERED EDUCATION IN A TECHNOLOGICAL AGE

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The technological age provides possibilities for education unthought of and even unimagined a few decades ago. One recent writer (Mood) reporting for the Carnegie Commission on Higher Education has even envisaged for America a "Video University" with a national network of cassettes and video equipment to instruct learners on all conceivable subjects and thereby virtually eliminating the need for college teachers. In his view, the former teacher's main task would be the use of his expertise to prepare the learning cassettes in his particular field. Students would learn at home, at work, or any place; take tests prepared by the experts; and receive "external degrees" from Video University. Thus, one could "graduate" from "college" without ever knowing a college professor or taking a traditional course. Mood observes that the "interpersonal" dimension usually associated with the interaction between student and professor is important, but he contends that interpersonal skills can be readily developed through the person's interaction with fellow workers, family members, et al; or that one can learn the requisite interpersonal skills through the use of cassettes offering instruction in that subject. This is comparable to saying that one learns to read and write by listening to lectures on these topics, or to suggesting that Klee and Magritte learned to paint from video-cassettes.

Despite the enormous costs of television and computers, the use of TV classes in universities and the employment of computer assisted instruction prove to be effective means of instruction and efficient uses of resources. After all, isn't it more cost effective for a university to present "Western Civilization 1210" to three hundred students utilizing a taped lecturer on TV? Not only does this provide inexpensive "survey" classes for the university, but the "teacher" can lecture to three hundred students while he is doing "important research" (or is that phrase redundant?) in his office, at home, or in Dublin, Ireland. This may be cost effective; it may be instruction; but in no sense of the word is it teaching.

Computer Assisted Instruction--CAI--may fare better in this critique. It does, to be sure, respond to students' inquiries in ways which the TV never does. It does, however, depend upon the programmer's anticipating all possible questions. Several practices usually associated with "good teaching" are present in CAI. The learner is active. She is a participant. Many computer programs are designed so that the student can experience initial success and is thereby motivated to continue. The failure syndrome characteristic of the marginal student can be effectively dealt with, and the neutral or even encouraging and enthusiastic responses of the computer (e.g. Control Data's "Plato") are far less threatening and far more reinforcing than the all too frequent acrid, bored, and sarcastic responses of uninterested "professors."

Mood, writing in 1973, decries the fact that education is currently labor-intensive, but he believes that improvements can be made in education "by changing it from a labor-intensive enterprise to one that uses capital judiciously." (Mood, 39) If the establishment of Mood's proposed Video University were realized, then "machines might carry out higher education in the future without benefit of faculty or campuses." (Mood, 41) Yet, in 1983 with the Video University far from realized, Michael W. Apple, writing on "Curriculum in the Year 2000: Tensions and Possibilities," observes:

> Instead of professional teachers who care about what they do and why they do it, we may have only alienated executors of someone else's plans. . . . (and) this danger seems likely to increase over time.
>
> . . . In essence, we have established a capital-intensive curriculum in our classrooms. Simply to keep the program going, a large amount of money must be set aside for the ongoing purchase of consumable materials. School districts may soon find themselves burdened with expensive "white elephants" as school budgets are reduced and money is no longer available to purchase the requisite workbooks, tests, worksheets, revised editions of "modules," and so forth. (Apple, 323)

Yet, with all this, teaching-learning today remains a labor-intensive--as opposed to capital-intensive--activity. The failure to realize this--although greater in this day of TV classes and CAI--is not to be associated only with advanced technology. Even without the use of TV, video cassettes, and computers, the person-centered dimension of education is often ignored. I recall vividly as a neophyte dean discovering a large group of faculty who proudly talked of "self-paced individualized instruction," which, upon close examination, consisted of their providing each student with a cassette recorder and appropriate cassettes (modules) accompanied by the instructions to return to the "learning lab" for an "objective" examination when the student was ready for a test.

Yet, if TV, cassette recorders, and CAI may constitute adequate instruction, but not effective teaching, what does? An examination of the literature on this subject during the past decade reveals a variety of answers. Consider a few.

In Higher Education in America Algo and Jean Henderson allot one chapter to the discussion of "Effective College Teaching." They believe that half or more of any faculty could increase its teaching effectiveness by developing a clear understanding of the teaching-learning process and by giving special attention to course planning and teaching methods. Growth in teaching effectiveness is possible, they observe, in several areas. These include: clarification of objectives relating to knowledge, skills and appreciations; better integration of these objectives with the specific outcomes expected; improvement of evaluation methods; and better understanding of the learning process. The Hendersons note that professors often place great stress on factual information and memorization, but to the extent that these are emphasized without definite application, the student's power of thinking—a basic aim of education—is neglected.

They further note that proper teaching must include training in problem solving, intercommunication between the student and teacher, and the knowledge of the importance of an exchange of ideas between student and student and teacher and student. Cooperative leadership, nondirective teaching, and a class arrangement which fosters group involvement are also constituents of good teaching.

Effective teaching today entails learning how to function as a member of a team as well as learning to take advantage of contemporary technology. Team teaching benefits the students by offering them several possibilities for learning with specialists who combine their knowledge. The computer not only collects, processes, stores, and dispenses data readily, but also provides learning through information theory, decision theory, games, systems problems, simulations, and models.

It is important that the instructor understand the needs and characteristics of the students, for the teacher can play an essential role in guiding students' thinking and decision making. Any teaching situation should attempt to ensure continuity of learning, expansion of comprehensions and competencies, and integration of varied learning experiences. (Henderson, 136) Student involvement in learning may also be accomplished through study-and-work programs, internships, study abroad, community projects, field studies, research problems, problem-focused discussions and role-playing. (Henderson, 137) In all cases the instructor should focus on student learning rather than merely on subject matter. (Henderson, 138) Educational objectives and anticipated outcomes should be considered as an integral part of the education process.

All these topics should indeed be discussed in any adequate consideration of effective college teaching. Moreover, the Hendersons realize that student involvement, student learning rather than subject matter, and the development of the student's power of thinking are important dimensions of effective college teaching. This realization indicates that they are aware of the central determinant of effective college teaching--namely, the student-teacher interrelationship. They realize the importance; yet, they merely mention that effective teaching requires intercommunication and a dynamic interrelation between the student and the teacher.

Moreover, I could find no articles dealing with the issue of student-teacher relationships in the actual teaching situation. No writer gave separate and distinct treatment to the topic, and in most instances the topic was not considered at all. James Lewis, Jr.'s Appraising Teacher Performance failed to consider the issue, while Change Magazine's Faculty Development in a Time of Retrenchment, Report on Teaching 3, and Report on Teaching 4, likewise make no mention of student-teacher relations. Even Kenneth Eble's Professors as Teachers, which is the result of Eble's two-year study, merely mentions that the student-teacher interrelationship is significant. Eble notes its importance but does not view its significance to warrant separate, specific treatment. A large section of Current Issues in Higher Education, 1976 entitled "Improving Teachers and Teaching" was silent on the theme. And I searched in vain for some treatment of the topic in Liberal Education, Improving College Teaching, Evaluating Instruction, and The Future of Higher Education. (Cf. Endnotes) All discussed similar topics, but each failed to assess the importance of the student-teacher relationship. I refer to these books and articles, not to support a contention. Rather, I refer to them as negative evidence that a basic dimension, perhaps even the most basic dimension, constitutive of effective teaching has merely been passed over fleetingly or not discussed at all.

Let it be noted that the teacher's knowledge of his subject matter, the knowledge of learning theory, and the knowledge and use of varying teaching methods, and a comfortable and pleasant environment are all important dimensions of effective teaching. However, the person attempting to teach may know his subject matter thoroughly; he may know all the requisite learning theory and methods; and the physical environment may be most conducive to learning. Yet, there nevertheless may be no effective teaching.

Mood's suggestion (Mood, 41) that teachers could be replaced by machines and thus provide effective, efficient, and quality education naively assumes a sophistication on the part of the student not usually experienced by those who have the task of counseling and advising. The belief that a person may receive "an external degree" by choosing what he will study from hundreds or thousands of available cassettes contributes to an even greater degree of fragmentation, compartmentalization, and randomness for which current educational practices employing majors, minors, and the departmentalization of knowledge are already receiving just criticism. Moreover, Mood's idea that a sufficient variety of "cassettes," making available the subject of one's interest, is in itself sufficient motivation for a student's continuing study is narrow, naive, and evidences ignorance concerning the reasons for college student attrition and retention.

The American College Testing Program's research reveals that in the United States in two-year colleges 50% of the students drop out by the end of the first year. In four-year colleges, 22% drop out by the end of the first year, 33.2%-44.7% by the end of the second year, and 50% have dropped out by the end of the fourth year. (Cope and Hannah; ACT Report) In addition, of those who remained in college, 75% indicated that a major factor in their retention was a faculty member who cared; 54% referred to an adviser's help beyond registration; and 58% indicated that affiliation with or participation in a campus organization was an important factor in their remaining in college. (ACT Report)

I have noted that the dimension of effective teaching which is virtually ignored or even considered useless by contemporary writers on the subject is that of the interrelationship between students and teachers. Without denying the importance of the many dimensions of teaching reviewed in the foregoing, note that various ones of these may have greater or less significance at different times. Yet, the teacher-student relation is ubiquitous and a *sine qua non* for effective teaching. The teaching-learning situation always involves the interrelationship of human beings, i.e., persons interacting. An educational model which views students at "its," so many "things" to be analyzed, shaped, and directed, will hardly contribute to a learning situation which evidences personal concern for the welfare of students as "persons" rather than "things." It will not be concerned with providing an environment conducive to developing individual responsibility and contributing to personal growth. The person-centered teacher, however, will relate to his students in such a way that their value as persons will be affirmed. Consider some of the characteristics of the person-centered learning-teaching situation, a milieu in which the value of all constituents as persons is affirmed.

The person-centered teacher will exemplify trust in the student participants in the learning situation. He will assume that the students are persons of good will, desiring to learn, and worthy of his serious attention and time. He will assume that the student participants are seeking to learn and to learn how to learn, and that they are not seeking to use or exploit one another. The effective teacher, one who is person-centered, will initiate the trusting relationship by being trusting, open, and honest himself. Such a stance involves risk, but without such risk we are doomed to a continuation of teacher-learner situations characterized by antagonistic or even adversarial relations which actually inhibit learning or make it impossible.

The person-centered teacher will believe in the student. He has faith in the student's potential to become. He knows of students' weaknesses and inadequacies, but rather than playing these up, he attempts to help the students develop their potentials. If the student realizes that the teacher believes in him and his abilities, he will apply himself more readily and be motivated to risk more involvement of himself in the learning situation.

The person-centered teacher relates to the student as person to person. He does not relate to the student as a faceless number among others. He realizes that each student is an individual person with possibilities, needs, life-situations, dreams, and interests which are unique to him and of extreme significance. The student likewise has the responsibility to relate to the teacher as a person. All too often the teacher-student relationship is synonymous with relationships of persons and things. Such relations can be characterized as: limited, closed, static, manipulative, non-reciprocal, lacking mutuality, repetitive, predictable, non-responsive, conditional. Person-to-person relations, however, are just the opposite. They can be contrasted with person-to-thing relations, respectively, as: unlimited, open, dynamic, non-manipulative, reciprocal, mutual, exemplifying novelty, non-predictable, responsive, unconditional.

The person-centered teacher will consider himself a participant in a learning community, a learning community composed of his students and himself. He, too, is a learner, participating with others in an attempt to understand themselves, the world in which they live, and their interrelations.

The person-centered teacher attempts to understand the student. He is not merely interested in disseminating information, nor concerned only with subject matter. But, as a minimum, he is concerned with the student--the person with whom he is relating--as a facilitator of learning. He is concerned with the significance of the subject matter to the student's life and growth.

The person-centered teacher will surrender his aggressive attitude and work, not for himself but for the welfare of his students. He is not interested in what he is becoming, but in who the student is becoming and in developing the student's potential for self-learning. Such a teacher contributes to the student's ability to learn to such an extent that the student-learner no longer needs him. The student learns to learn on his own without the need of a teacher. The person-centered teacher gains himself by losing himself. He is one who is not so concerned for his own welfare--his scholarly reputation, tenure, promotion, appearances of infallibility--that such concerns interfere with his relation to his students. He is rather concerned with the welfare of his students. One is a person-centered teacher to the extent that he gives priority to the welfare of his students.

The person-centered teacher will challenge the student to fulfill his potential. Rather than being negative and judgmental, he will help the student envisage who he can become. He will attempt to be the leader in establishing a community of learning characterized by openness and freedom. He will exemplify an understanding that knowledge, truth, and freedom are intrinsically interrelated and not possible apart from each other.

The person-centered teacher will know that he is not a dispenser of knowledge or mere facts to be memorized and repeated. Rather, he will know that his task is that of a facilitator of learning. He is involved in the process of education. "Education" viewed from the central idea conveyed in the Latin educere, "to lead out," "to lead forth." He will be concerned with mere facts only in so far as they help the student to learn how to think, how to analyze situations, how to communicate, how to make judgments, and how to discriminate among values; for these should be the central concern in the learning situation.

The person-centered teacher will realize that the student, a human being, a person, has a paradoxical character. He can simultaneously be, as Pascal has observed, the greatest and the worst of the universe. Through his use of memory, imagination, reason, and language, the person can be the epitome of creativity and creation. Yet, just as he alone among the animal world has these powers, his power to misuse them through egotism, selfishness, aggressiveness, and desire for absolute power makes him alone the potential destroyer of the universe. The person-centered teacher will facilitate the student's channeling of these powers into creative rather than destructive endeavors.

His realization of the paradoxical possibilities in human nature will enable the person-centered teacher to realize that the teacher-learner encounter may involve betrayals, failures, resentment, hostility, and other painful, negative, and even destructive dynamics. Yet, he should be prepared for such experiences and be able to confront them without retaliating from a similar standpoint of fear, mistrust, betrayal, resentment, or vindictiveness. Just as the creative factor within the teaching-learning situation is one of relationship, so also the destructive factor within the teaching-learning milieu is one of relationship. It is the teacher's responsibility, because of his greater experience, greater knowledge, and leadership role, to confront or even absorb destructive aspects of the learning-teaching relationship without resorting to retaliating defensively in kind.

The teacher in the person-centered teaching-learning situation will take with utmost seriousness his responsibility both to be a facilitator of learning and to be the creator of a learning community in which all participants are treated as persons. But the person-centered teaching-learning situation is not a permissive one in which students are pampered, negative situations overlooked, or challenges not made. This would be antithetical to a person-centered community. For in a person-centered community privileges of personhood are bestowed upon all, but the responsibilities of being a person become the responsibility of each participant. To accept less, to demand less, would both demean the value of persons and fail to facilitate the growth of students in their becoming as persons.

The teaching-learning situation thus described is no easy attainment. Nor is it one which is permissive, or one in which the teacher is a "push-over." For in a person-centered learning situation, all participants are responsible for the success of the enterprise, and all benefit from its success. All characteristics applicable to the teacher are applicable progressively--as the student grows and develops--to the student. Trust, honesty, openness, belief in the other, participation, good-will, assuming the responsibilities of personhood are required of all. The person-centered teacher is one who makes demands on his students, but he is one who does so because he believes in the students' potentialities and possibilities for growth. But, what is more, in making demands he simultaneously provides assistance and resources for fulfilling these demands.

The foregoing is merely a sketch or "programmatic essay" which could be more fully developed. A more detailed discussion of the distinctions between person-to-person relations and person-to-thing relations would certainly contribute to a better understanding of person-centered education. Moreover, evidence from actual attempts at person-centered education would be helpful. One does not have "world enough nor time enough" to consider these in this restricted space. Yet, with these limitations, this brief essay affirms unequivocally that the most effective learning situations--and even the most efficient in terms of developing and salvaging human potential--are those in which all participants experience the interrelation of person to person in a cooperative endeavor, in a community of learning. The challenge of technology is to retain and maintain such community while employing the best which technology has to offer for the welfare of humans.

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EDUCATIONAL TECHNOLOGY - THE OPTIONAL EXTRA THAT HAS BECOME A NECESSITY

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University lecturers are appointed, in most British Universities, on the strength of their research interests and abilities, not on their ability to teach. This is known and understood within the various institutions but not to society at large, which assumes that "lecturers" know how to lecture. In fact, the ability to transfer the knowledge of any discipline - to say nothing of an enthusiasm for its particular ethos - depends entirely on the interest of the lecturer in the processes of communication. But many lecturers tend to regard communication - except for the papers so essential if they are to climb the academic ladder - as an interruption to their real work ... research. If the students find their lectures, their seminars and even their tutorials to be mere recitals of facts, delivered in the jargon of their particular subject - without interest in, without understanding of, and often without sympathy for their audience, that's too bad. It's the students' job to make sense of it ... you don't spoonfeed students!

Now, as a result of research into the processes of teaching and learning, because the number of lecturers has declined (due to financial restrictions), and because students have changed, academics - even the most conservative - have also begun to change or have at least begun to consider the necessity for change.

Probably the greatest impulse towards an improvement in University teaching and the adoption of different communication techniques comes from the students themselves. Being less print-orientated than their predecessors, to them audiotapes, films, videotapes, computational aids and all the other techniques of the audiovisual world - produced to a high standard by professionals - are not novelty items or optional extras. They are part of the students' lives and the students expect, in the nature of things, that the same audiovisual techniques will be used in their University teaching as were used in their primary and secondary schools, and that they will be used even more effectively.

Students are already aware that these techniques enable them to exercise greater control over their individual learning processes - to study at their own pace, to use a variety of study methods, to repeat material as often as necessary to reinforce or revise. Academics are becoming increasingly aware of the advantages inherent in the use of colour, movement, the ability to speed up and slow down processes, the ability to record expensive or difficult procedures and so on, especially when complex concepts are involved. So the stage appears to be set for the wholescale adoption of "educational technology" as a powerful new weapon in the armoury of University teachers.

This is supported by the interest of the commercial world in the provision of the "hardware" and "software" of educational technology, i.e. the equipment needed to replay audiotapes, slide/tapes, films, videotapes, computer programmes etc., (the "hardware"), and the material to be replayed (the "software"). Unfortunately there is a marked imbalance. The thrust of the commercial interest has been in the hardware, resulting in machinery of all shapes, sizes and capabilities being readily - and not too expensively - available. Indeed, many Universities are already, or soon will be, adequately equipped with the hardware of educational technology. The software is in a rather less satisfactory position. A certain amount of material is available commercially but, while of a very high standard, it is often not relevant to particular courses of academic study.

For those academics unwilling or unable to vary their traditional method of teaching this imbalance strengthens their already marked distrust of any innovation, especially one involving "gimmicky" audiovisual techniques. To those who feel that educational technology can contribute considerably to their work it creates a serious problem. With little software on the market that is relevant, yet being already convinced of the necessity for such material, the academic is faced with the prospect of "going it alone" and making his own software.

On the face of it there seems no reason why an academic should not make his own software. After all, he is the subject specialist, he knows his own students and he knows which particular facts and concepts he wishes them to understand. There is, however, a wry irony in the situation. On the one hand, among the reasons for change which causes the academic to use audiovisual technology is the less than total success he has had previously in communicating his subject to his students. On the other hand, to make successful audiovisual material of whatever format requires a fairly extensive understanding of the various techniques which can be employed, their relative advantages and disadvantages, and some knowledge of the psychology of visual and aural perception - the lack of which was part of the original problem.

But strongly impelled by the need for change, academics frequently launch into the production of audiovisual materials with extremely varied results. A small amount of the material is good, most of it just about scrapes by, and some is downright disasterous. In my own medical school, for example, I have seen academics produce out-of-focus pictures of important information, badly edit videotape material causing total interruption of vital visual sequences and - on one classic occasion - make a 50 minute videotape to fit into a 40 minute lecture period. To replace or to illustrate a first-class lecture with a second-class videotape or film does not improve the quality of teaching, nor encourage the students to learn. It merely calls into question the validity of educational technology in general. Few academics have the time or the motivation to acquire the skills and knowledge to become expert in one form of communication, let alone several, so even their best efforts rarely exceed the standard of the ardent amateur and are recognised and treated as such by the students - with tolerant amusement. And yet there is a simple way to resolve this dilemma. It is to consult and co-operate with someone whose discipline is communication. Most Universities have some form of Audiovisual Centre or Department of Communication whose senior staff include academics who have been trained by and worked with either the BBC, Independent TV, or film-producing companies (or equivalent organisations in other countries). They therefore have some general understanding of academic problems as well as their specialist knowledge of the techniques of communication.

Yet it is surprising how many academics do not follow this particular option and consult communication experts. Perhaps the traditional and rather formal University lecture has an air of respectability about it conferred by long use, while the techniques of communication have not yet been with us long enough to assume the respectability of custom. Perhaps they cannot find, or are not prepared to find, the time to "do it properly". Perhaps they believe that the involvement of any person working outside their discipline will somehow devalue their mystery, or that their particular style cannot be bettered, or - and this is a common though seldom admitted fear - that they will prove inadequate in any form of teaching other than that to which they have become accustomed. Certainly the thoughtful academic is frequently suspicious of what seems to be the "showbiz" - quite frankly, the entertaining - nature of the audiovisual world; wary of sound, vision, colour and electronic gadgetry and the theatrical nature of the whole business.

I believe this wariness understandable but misplaced. Think back - the lectures which lodge most firmly in the memory, and the men or women who delivered them, do so because they were the best lectures, delivered with all the force of the personalities of the best lecturers. They were performances, they were tours de force, they were - like it or not - theatre. Rarely were they extempore. By far the majority had been carefully prepared and were delivered using all the techniques of good lecturing - the correct use of voice (pitch, pace and emphasis), the right gestures, attitudes and emotions; a touch of humour, perhaps, the dramatic pause to give emphasis to a point, the sudden movement or contrast to regain flagging attention - all the skills of the theatre harnessed and controlled to one end, to extend the students' education and experience.

These very skills, so rare among academics, are the essence of the communicator's discipline and through him they are at the disposal of the academic. If the academic can overcome his mistrust of the "theatrical" and his aversion to having his discipline made readily accessible to his audience, he can add a new dimension to his teaching. Once he is aware that the communicator will not want him to use any particular medium or technique for its own sake, but only for the contribution it will make to the teaching process, once he accepts the need for the expenditure of effort and time, and the need for planning - unlike many lectures the best audiovisual aids are not created the night before they are required - he will find that educational technology can and will extend the students' education and experience.

But to do this successfully calls for the combining of two apparently disparate skills - that of the subject expert and the communications expert. And again the academic may draw back from such a merger. Aware of the complexities of his own discipline, with its own conventions and vocabulary built up over the years, he assumes - correctly - that the communicator has his conventions and vocabulary too. May not this inhibit fruitful collaboration, with too much time spent on each coming to some understanding of the other's discipline? How do two highly developed individuals, each convinced of his ability to walk on the water, but each equally capable of drowning, jointly tackle the creation of teaching material which will enhance the students' learning?

I believe that such collaborations are possible because both specialists start and end at the same point - will the material do a defined job for its intended audience? If the answer is "No" then the fault must be in the material not the audience. And the answer will be "No", even though both specialists have done their best, if together they have not established what that best should be. There is a foundation of questions on which both specialists must agree before any extensive planning takes place, and without this foundation the collaboration and its product are bound to fail. There are at least ten general areas for discussion.

Both the lecturer and the communications specialist (the "media man") must be very clear about the purpose of the proposed material. Is it to teach a new point? (If so, what?) Is it to be a reminder or summary of points that have already been taught? Is it to convey a philosophical concept or to illustrate the three-dimensional aspect of something? Usually the lecturer begins with a clear idea as he draws the bare bones of his topic together for his forthcoming teaching session but, when the bones begin to put on flesh, the clear idea often becomes decidely opaque! To define the objectives of any teaching is good practice. To define the role of any technology used in teaching is not only good practice - it is absolutely vital if the media man is to suggest the most appropriate and effective audiovisual technique.

Most academics surround themselves and subjects with many unnecessary complexities, so the amount of information they want to include in any piece of audiovisual teaching material is usually far greater than is really necessary. The media man needs to know how much of the information asked for by the lecturer is essential and how much is actually unnecessary detail. It is surprising how often questions like "Is that point essential?", "Must that bit be included?", "Would it matter if these two things were merged?", produce the answer "No!" At times of course the point to be made by the audiovisual material is very complex because it deals with the interaction of numerous factors. In these circumstances the information must be built up step by step - using three slides instead of one, each more complex than the one before; using overlays on a basic overhead projection film; or adding information bit at a time to the computer screen, for example.

It is important for the lecturer and the media man to know how the proposed material will be used. Will it, for example, be part of an unattended display? -

a model or illustration, or something available to students on a self-access basis - in which case it must be self-explanatory. Will it be used during a lecture (a film or a videotape, for example) or as part of a more informal teaching session? If so, could some information be omitted from the audio-visual material and be added verbally during the teaching session? Could the omission of some information even be the means of provoking discussion during the teaching session?

The complexity of any audiovisual material must be influenced by the amount of time a student has to study it. If there is no time limit - if the material is available for unlimited self-study or is part of a permanent display - much more detail is possible than if the material is only to be shown once, as often happens with slides, films or videotapes. How often did you miss the one "gem" in a lecture because you were busy reading the fine scrawl on the blackboard?

University lecturers are rarely able to choose their lecture room, let alone decide on its size and shape. But the physical framework of a teaching session can become important when any audiovisual material is used. How many students can see the material at one time? How far away from it will they be? Will the image be distorted? The media man must be given some idea of where the material is to be used so that he can work out the size of illustrations to be prepared, how large any lettering should be and how much detail would be appropriate. It might also help to know where the power points are, and the black-out curtains!

Few media men are likely to lie awake at night wondering whether the work they are preparing will be used once or a hundred times - but it can concern the teacher. Will it break? Can it be cleaned? Will it get dirty? Will it stand repeated handling? Could it be replaced? A certain amount of wear and tear is inevitable if audiovisual material is used frequently, but careful consideration in the planning stage should keep it to a minimum.

The question of colour would seem to be the exclusive province of the media man, but even a discussion about colour can be useful. For example, the lecturer must pass on any recognised colour conventions for his subject matter. Are there colours which *must* be used, or be avoided because students may mistakenly associate them with another subject area? Is the proposed visual material an addition to material already used for teaching this subject and if so should the same colours be used to maintain visual continuity?

In considering costs there are a number of pitfalls to avoid. The lecturer's department has almost certainly not earmarked any funds for audiovisual material, and is likely to have little idea of the cost of art or photographic materials and the charges levied by commercial media men or computer programmers. Under these circumstances, justifying any expenses to the finance committee cannot be done with any conviction! It is vital to discuss costs at an early stage so that the lecturer knows what sort of bill to expect and how it is made up.

The question of time must be considered carefully. No lecturer can ever give as much time as he should to the media man, or ever get as much of the media man's time as he would like. But producing good software does take a great deal of time, and planning should not be left to the last possible minute.

You may have noticed that there has been no mention of copyright so far, although the media man will probably raise it at the outset. This is because it is of more concern to him than it is to the academic, although in these days it *should* concern all academics. Copyright law is extremely complicated and nowadays almost everything is covered. Until clear guidance can be obtained on any particular item, the only safe course is to avoid copying! Where this is not possible, copyright clearance must be sought from the appropriate authorities.

The consideration of such basic issues starts a collaboration whose end result is a piece of audiovisual teaching material. The value of this material can only be established after it has been used and by reference to its audience, in fact by considering the question I raised earlier "Has it done the job it was intended to do for its intended audience?" The evaluation of teaching is a subject outside the scope of this paper but the necessity for every University lecturer to question the effectiveness of his teaching is, I believe, of the utmost importance. Such evaluation as has been done on educational technology tends to support my contention that the best audiovisual material not only conveys the points which the lecturer wants to make, in the way he wants to make them (the contribution of the subject specialist), but does so in the most effective manner and with a sense of style (the contribution of the media man).

Students today inhabit and are completely at home in the audiovisual world - the world of colour, vision, three-dimensional movement and computational magic. To communicate most effectively the academic must enter, or at least come to terms with, that world. It may be unknown country to him, but there are guides - the communicators. All guides need only two things - first a knowledge of the intended destination and what the travellers wish to see on the way, and second an acceptance of their ability to suggest the best routes and modes of transport.

Academics must make this journey. They can make it alone in which case they may well run the risk of losing themselves and their students, or they can use a guide and more than double their chances of arriving successfully at their chosen destination, with their students' horizons widened and their experiences enriched.

HOLISM AND EDUCATION:
IMPROVING LEARNING IN THE EDUCATIONAL SETTING

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The holistic approach to the wellness of persons movement is an idea whose time has come. The approach has had a strong conceptual development,[1] and various strands of it are evident on the college campus, particularly among faculty who are engaged in the health sciences. However, there are strong and compelling claims for the holist approach as a valid theory for improving the learning environment in educational settings. It involves a conscious approach to the learner as an entire person who is developing in all aspects of being.

The acceptance of such an approach is not a simple process. Embracing conceptually the tenets of the holistic view of the learner on the part of the faculty may prove to be an enormous challenge. Concensus may only be reached after a long and painful educational process, involving clear philosophies of the nature of man and the interacting environment. And these are heady constructs to build.

Equally important, holism in the educational setting begins only when we seriously look at our students and their characteristics and concerns. Levine[2] and DeCoster[3] have given us some excellent insights into the students we are accepting at this time in our colleges. They are described as the most anxiety-ridden generation yet to enter the college setting, and the situation is worsening rather than growing better. There are a number of causes contributing to this phenomenon.

1. Students face a world of declining resources. They are aware that we have squandered the resources we have, that we are a "throw-away" society. They fear that they will not have the resources available which will enable them to live lives of dignity and wellness.

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2. They are aware of the use and misuse of substances and the double standard that exists for the adult population. We caution them against the use of alcohol, drugs, and excessive medication - and then continue to abuse these things ourselves. They experience much substance abuse in their own lives, and wonder how they will handle these substances in their future.

3. They are deeply concerned about survival in a nuclear age. On more and more campuses, students express their disillusion and seem unwilling to accept the idea that there may be a future. They truly sense, rightly or wrongly, that our leadership may indeed bring them to the ultimate disaster.

4. They are more than career-oriented, as we once labeled them. They are now career-anxious, or career obsessive. All learning must be related to their careers or it is meaningless. And they will stop at nothing to be achievers in their careers. No short-cuts are avoided. They will cheat - in almost any way possible - and there are no moral implications that override the career success which they have set for themselves.

5. Their concern for the job market is real. Will they be able to get a job, to earn an honest living, to live in dignity? They have reason to doubt, to be afraid and compulsively anxious.

6. They question the meaning of their own existence. Does life have any meaning, and if so, what is it? They need to work this out, and few of them find the solutions. Thus, our students are not well in the emotional and psychological sense of the word. Statistics convince us that they are no better off in terms of their physical wellness. They have the natural resiliency of youth, but they have abused, and are abusing, their bodies at an awesome rate.

Furthermore, they are unprepared academically. They have been entertained at home and confined with teachers in schools. There is nothing to indicate they should be prepared for higher education, and they are not.

I would add another note; they are non-generative, and this is indeed cause for great concern.

The whole notion of generativity has been well-developed by Lee Knefelkamp, a colleague at the University of Maryland[4] and by Browning in his excellent book, Generative Man. Browning,[5] as quoted in Knefelkamp, talks about the sense of common purpose, the caring, which is generativity. He suggests that generativity is the process that is guided by the nature of that which is to be cared for--persons, health, students, the environment. Generativity does not characterize our society, nor our students. Browning describes the non-generative state:

> For it is irresponsible creativity devoid of a quality of enduring care that is man's grandest temptation and greatest fault, not only throughout all of his history but most specifically during modern times. The real problem with man's Promethean will is not that he aspires to do too much but aspires to do more than he is able or willing to care for.[6]

I believe that this generativity is the key to the wellness and fullness of learning on the campus, and that educators are the only ones who can give health, give generativity, and reach the student holistically.

If we are to hear students, listen to their concerns, we need to understand how they learn, how they cope, and how we reach out to them. We need to understand how they develop and become cognizant of the theories that explain the learning and developing process.

Knefelkamp suggests certain groups of theories which describe the student's advancement toward wellness and maturity:

> Inherent in each student development model are implications for the design of a developmentally enhancing community. The maturity end goals described by each of the theories are remarkably similar to the end goals of higher education itself: the facilitation of human beings who can reason as well as read; who possess insight as well as knowledge; who have the capacity for empathy and ethical conduct; who recognize, appreciate, and are not threatened by individual differences; and who have developed the interpersonal skills and thinking processes necessary for living in a complex and diverse society.

Below is a brief overview of each of the clusters of theories.[7]

The first cluster is that of the psychosocial theorists, notably Erickson and Chickering. These models give us a sense of the developmental tasks of learning as students mature, and may be very helpful in analyzing the needs of older learners who enter our programs. An alternate approach is to consider typology models or theories which help to explain individual differences among students. An example of a typology model is the Meyer-Briggs test. These models suggest that individuals change, grow, and differ. This is helpful for individual assessment.

Probably the most useful set of theories is that group described as cognitive-developmental. Familiar names emerge in this category, including Piaget, Kohlberg, and Hunt. Generally these models show an invariant developmental pattern, and Kohlberg's model is a familiar example of this. One theorist stands out in this group, and that is J. W. Perry:

> Perry (1970) and his associates at Harvard University have derived a cognitive stage framework focusing upon intellectual and ethical development which is elegantly descriptive of how the college student approaches the learning environment. Nine positions or stages, each representing a qualitatively different mode of thinking about the nature of knowledge, make up the Perry model. The positions tend to be reflected in the students' perceptions of the teacher's role and the role of the student-as-learner. The nine positions are grouped into four categories: dualism, multiplicity, relativism, and commitment within relativism.[8]

To consider only these four categories is an oversimplification of Perry's work, and further study of the model is recommended. However, the theory is based on the premise that students come to us with less sophisticated modes of reasoning than we have previously assumed. The dualistic perspective is that assumed by most beginning college students. They view issues as known or knowledgeable, and the teacher as the authority. They are accustomed to memorizing information, to returning evidence of information to those who teach, and they expect to receive a grade on this evidence. Students in the dualistic frame of thought are made uneasy by the existence of multiples in learning.

It is only as they progress from dualism, through multiplicity, relativism, and commitment that they are able to accept the demands of a pluralistic world, and grasp the identity resolution needed to stabilize and understand the self.

> Perry's discussion of the commitment positions has much to say to a community of scholars. He emphasizes the students' need to 'brush up against faculty to find out if they are real' and to use faculty as sources of role modeling and hope...hope that despite loneliness, they can make meaning in their lives; hope that despite the risk of uncertainty in nearly everything, they can dare to enter into relationships with loved ones; hope that the sense of individuality that has been so newly discovered is also compatible with a sense of community.[9]

How does the holistic approach to the student with the multiplicity of emotional and intellectual growth needs impact the collegiate professor? How does this professor relate to contemporary students and their ways of knowing and developing? Stanford and Roark maintain "that the chief functions of teachers are to engage in interpersonal relationships which are health and growth-producing and to provide environments which favor this type of interaction for students."[10] This sustaining relationship involves empathy or understanding, congruence or genuineness, and nonjudgmental warm personal regard or respect. The teacher's first role is to establish that warm accepting climate in which student and teacher view each other as learners on the long trip to wellness and maturity. In such a climate, the student develops that sense of individuality and identity which Perry cites as leading to commitment, the final stage of the learning process.

From this perspective, the second function of the teacher assumes critical dimensions, and this is the modeling function. Modeling is explained as a "behaviorist method" with strong reinforcing aspects. The modeling or imitation method provides a complete behavioral sequence for the learner. Much trial and error is eliminated. Modeling allows for the learning of complex patterns of behavior as wholes, particularly social behaviors. Modeling involves experiential learning in which the instructor personally demonstrates the concepts being conveyed to students. It remains a long-standing truism that modeling is still the strongest and most retentive learning process available.

The teacher is the key person in the process of cognitive, as well as affective development. As such, the teacher serves as a resource person in learning by planning courses to take advantage of his or her specialized knowledge. This includes the setting up of behavioral objectives, both in the affective and the cognitive domains. This is important. We are accustomed to didactic teaching, to stating cognitive objectives. We need to realize that the holistic approach implies much more.

The cognitive content is the starting point for learning, but every cognitive lesson also involves affective outcomes, and these are valid instructional and behavioral objectives. Furthermore, content in the holistic approach starts with the wellness concept. The health and generativity of the whole person is the basis of content. And it is important that each learning segment proceed from this basic notion.

Cognitive content and affective outcomes are packaged or presented in an experiential learning situation, and this implies a serious consideration of teaching methodology, or pedagogy. The didactic method of presenting a lecture of important information is used very minimally in experiential or holistic learning. Rather, the methodology chosen is the group process, in which students work in dyads, triads, or larger groupings. The teacher organizes material in such a way that students analyze content, verbalize cognitive and affective learnings, and perform in simulated situations. As students participate as active learners, in the group situation, ample opportunity is provided to move through dualism, multiplicity, relativism, and commitment as described by Perry.

An important aspect of teaching to the whole person by the group method is the emphasis on problem-solving. The development of analytical skills of reasoning and inquiry are developed initially in the liberal arts curriculum. These skills are applied in the group setting as the students critically analyze and probe the significant problems encountered in health care. The teacher fosters the development of the student's analytical and quantative skills which provide the principles of criticism and modes for acquiring data and form the rational basis for decision-making. Many problems encountered are largely moral or ethical so that the basis for decision making is not quantative, but is formed on deeper philosophical or analytical grounds. The important aspect of problem-solving is that students engage in the process in an information intermix--an intermix in which students as peers work together with the instructor who functions as observer and facilitator.

The question is often raised as to the place of values in the holistic approach to collegiate education. Certainly it is an important issue and needs to be considered. However, I tend to believe that the whole learning process is really pointed toward the valuing process in every aspect of its development. If we are creating the healthy, sustaining climate that is so central to the process; if we are aware and conscious of the role model function; and if we have listened to students, analyzed their needs, and heard their pleas for help, I believe we are allowing students to create value systems. When they reach the point of commitment, they are determining values, and if the learning process has been effective, they will value wellness; value the generative function in society, and value the human person that they are and are becoming.

What of the community of scholars and holism on the campus? Knefelkamp speaks to the shaky structures which undergird campus life at present. Faced as we are with severe limitations in terms of resources in higher education, we seem to be retreating into our own campuses, becoming openly divisive in our competition for scarce resources. We are actually destroying any vestiges of mutuality or supportive environments which may have been carefully nurtured by those who went before us. She quotes:

> Erik Erikson, a brilliant observer of our society, our institutions, and the process of human development, has demonstrated that environments characterized by mistrust, doubt, limitation, feelings of inferiority and powerlessness are environments that contribute to identity confusion and inhibit the development of the mature healthy personality or institution. The mature personality or institution is characterized by the qualities of hope, the capacity to act within limitations, purposefulness, the freedom to be responsive, a sense of competence, confidence, and a sense of ethics. But most importantly, the mature person or institution is characterized by the capacity for generativity, the capacity and the ability to care for that which we have created: children, knowledge, students, faculty, staff, entire institutions.[11]

Faculty and administrators must address the problems of wellness, of generativity, and of a positive climate, all at a very difficult period in our history. As we look about at our campuses, we see evidence of our tendency to squander and waste with no sense of generativity; to have no sense of our stewardship over our bodies and our environment. We should not be afraid to exert ourselves in the fight to preserve what we have and to build a better learning environment that is wellness-oriented, with a strong, supportive faculty and a strong measure of peer support. The willingness of faculty and administration to show leadership in the development of a wellness climate in which the student is received holistically constitutes one of the few bright hopes which academia must hold on to if it is to be the force in learning and in society that it purports to be.

Many writers mentioned above talk of a whole person--whole in mind, body, and spirit. The use of the word spirit brings up one final point. Yahn defines "spirit" as "that which gives meaning and direction to life--a sense of happiness. It is often used in a pragmatic rather than in a religious or mystical sense. Spiritual growth is experienced by actualization of inherent human potentials and personal connection to a greater reality, which may be God, history, or merely nature."[12] Holism stresses an understanding of the "spirit" which gives direction to the self, the humanism that daily living presupposes. All men and women are created equal--their common "creatureliness" constitutes a common sharing in the destiny of humanity. The natural moral law, as expressed by the United Nations and at the Nuremberg trials, reaffirms the dignity of human person--the right to life, to bodily integrity, to basic human dignity, both in life and in death. This binding truth and awareness of the spirit will be the cornerstone for the ethical practice of the holistic educator.

As we leave each other, we often admonish "keep well." It is far more than a cliche. We must keep well, we must build a generative society. Our students need us to keep well, and so does a troubled world. Because of us, many others will keep well, and our job as learning and teaching experts will be well-done.

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THE RELATIVE IMPORTANCE OF THE SOCIAL AND INDIVIDUAL DIMENSIONS OF THE TEACHING AND LEARNING SITUATION: A SYNTHESIS OF TWO DECADES OF RESEARCH

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1. The Changing Context of Research on Individual Differences in Learning

Ruth Beard asserts that when teachers were asked twenty years ago which factors lead some students to success rather than others, they would answer in terms of intellectual ability, time devoted to outside interests and study methods. Today they are more likely to mention students' expectations of their courses and their teachers, their orientations, their different levels of maturity, their study methods, their cognitive styles and personality differences. There is thus an awareness among teachers of the relevance of these factors and an emerging recognition that students are individuals with different needs that are best met in different ways.(1)

But, for teachers and researchers alike, the increased awareness has not removed a sense of unease about the current state of research, whether our preference or involvement has been associated with past or present approaches. We all know of departments where failure rates have remained stable for decades, even though the student population has changed markedly in that time; and that differences between departments are also extraordinarily stable and frequently quite arbitrary. This phenomenon has been described by the Law of Posthumus, which dates from 1940. (2) It postulates that a teacher unconsciously directs his attention to the average group of any class, and thereby fails to observe differences between one group and the next. The result is that the distribution of grades over consecutive classes, including the ratio of passing to failing grades, remains constant.

But, while the credibility of this assertion is not to be denied, it affords an incomplete explanation of the way in which system factors can override individual differences. The situation can well be compared with one described by the economist Galbraith. In his analysis of the nature of poverty, he distinguishes first of all between mass and individual poverty. There are some countries where the general standard of living is low, and few manage to rise above it; and there are others where there is general prosperity, but some individuals fail to achieve it. (3) So it is with student success and failure; under mass attrition, we can consider how system factors dominate. Individual characteristics and particular skills can lead to success even in an unfavourable environment; or, where they are absent, to lack of it in a favourable one. The purpose of this paper is to point out that the social and psychological dimensions of teaching and learning ought to be considered together; and that careful attention to the problems of students en masse can reduce problems of individual difficulty to manageable proportions, even where student numbers are large and expenditure is restricted. It represents a summary statement of a recent study of the problems of access to university and initial success within it. (4)

2. The Relationship between Attrition Behaviours and System Factors

Reference has been made to the Law of Posthumus, and the constancy of success rates in a given department over time. Most academic observers will have experienced the enaction of the mutually accepted but rarely published concept of a "proper wastage rate". Malleson has quoted the evidence of Vice Chancellors of British Universities to the Robbins Committee on Higher Education, where they put forward the complacent view that a wastage rate of 10% was 'about right'. They failed to recognise that 10% is an average, made up of rates varying from 2% to 25%. Neither did they comment on departments which deviate from 10%. Thus, at least as far as British universities are concerned, 10% seems to be understood as a norm to strive for. What is so fascinating for the observer of a number of national systems is that such norms are found everywhere, but there actual value will vary markedly from one country, or one type of institution, to another. (5)

But it is not only average dropout rates which depend on particular systems. The particular type of attrition behaviour encountered in different countries is also so specific, it must also be considered to be system dependent. Thus, in U.K., where transfer is difficult and chances of retaking examinations are slim, students are classified simply as dropouts and persisters. In the Netherlands, examinations can be postponed and retaken. Many students therefore procrastinate, and are referred to as delayed (vertraagde); transfer is possible, but brings penalties. Both delayed and transferred students are more at risk of total dropout than persisters. In USA transfer is easily accommodated and not linked with later study difficulty, so that it is hardly to be considered as a form of attrition behaviour. It is not without interest that the term for delayed students, so familiar in Dutch, has no real equivalent in English. (4)

3. Individual Characteristics Associated with Study Success

The research in which individual characteristics are correlated with study success has been surveyed and is well known. (6) (7) (8) Brief reference will be made to it here. It is useful to divide those factors which may be ascertained before a student enters college from those which only become known after studies have been commenced. The first group form the basis of the research tradition in which criteria for success in higher education were sought which could form a basis for reliable selection procedures; or alternatively, where the use of such criteria would be socially and politically unacceptable as a basis for selection they are necessary for the promotion of positive action programmes. The second group of factors ought to form a basis for policies and techniques which minimise student attrition.

3.1 Information available before entry

The characteristics which are utilised as a basis for selection are tests of general or scholastic ability, grade point average and tests of school achievement. In the United States where a large proportion of the cohort proceeds from high school to college, correlations of about 0.5 are found; but in the more homogeneous higher education populations of Europe they are rarely so high. Little can be expected from improved selection methods in the improvement of the cost effectiveness of higher education since better predictors are unlikely to be available.

The advantages of the WASP in the United States are well known. In the college situation, Elton has extended the concept to encapsulate the characteristics most likely to be associated with a successful student; WASPYSMM is a white anglo-saxon protestant young middle class male. (9) But, typical though he may now be, there is controversy over the value of his attributes. A Dale effect has been identified so far as class is concerned, so that in an élite university students with a deprived SES background do particularly well; but they are so under represented, it is evident that only the most gifted and motivated have overcome the previous hurdles.

3.2 Information available after entry

3.2.1 Personality

There have been attempts over several decades to integrate measures of personality and learning. For present purposes, the research may be summarised by saying that no single personality variable accounts for more than a small part of the variance in study success. (6) Using the techniques of zone analysis, Wankowski found that extreme neuroticism related to failure and extreme introversion related to success. His analysis also showed marked differences in personality distributions in different university departments, and suggested that success may be associated with a 'preferred type'. (11). The following high attainment clusters have been identified by Entwistle and Wilson:

1. Highly motivated stable scientists.
2. Hard working syllabus free arts students.
3. Anxious students working long hours.
4. Hard working students with high religious values. (6)

It will be noted that such attributes as 'highly motivated','hard working' can be acquired, and they are more in the nature of symptoms than causes. Unfortunately, they can also be lost, and what we need to know is not so much whether they are present, but when they were lost and why, and how they might be restored.

3.2.2. Study Methods

Some studies have indicated that success is related to time spent in study, but this is not a general finding. Long hours of ineffective study cannot lead to success, and indeed obsessiveness is considered a symptom of study difficulty by Malleson and Ryle.(5) (12)(13). Low motivation and disorganisation have been associated with study difficulties. (14) Gibbs points out that many so called good habits are the result, not the cause of the way that a student approaches his studying. The factors which most clearly relate to what he is doing are his purpose and perceptions of the demands of the study task. Thus if a tutor wishes to influence his student's learning, then the proper focus of his attention is the student's purposes and perceptions; it follows that a tutor must work in a concrete situation where tasks are real and learning purposes identifiable. (15)

3.2.3. Learning Styles and Learning Skills

While these two fields of research hold much in common, there is a difference of emphasis. Research in learning styles has been undertaken by those in the ATI tradition, and work by Pask, by Marton and colleagues now receive considerable attention. In order to assemble reliable data learning tasks are typically short term and task and learning environment are controlled. Research in Birmingham, for example, where introverts have been found to prefer deductive methods which in their turn bore extraverts, imply the need for 'separate but equal' treatment. (16) Likewise Hudson's syllabus bound and syllabus free students. (17) But Marton's differentiation of 'deep approach' and 'surface approach' tends to suggest that some learning strategies are inadequate. The important question is how far such differences are characteristic, and to what extent can more efficient strategies be learned? (18) Perry described how a group enrolled for a study skills course were first asked to read a chapter of a text, and were told that after 20 minutes they would be tested on it. It was clearly impossible to complete the task in the time available; nevertheless all the students proceeded steadily from page 1, and none found the summary placed at the end of the chapter. In a short while all had improved their learning strategies. (19) Raaheim has described how students arrive at university able to learn detail, but not to carry on an academic discourse and asks the question, are they unsuited for the sort of tasks that will confront them, or merely unfamiliar with them? He showed that the latter is far more often the case. Preparation for a test examination in which a question requiring understanding of and integration of different aspects of the syllabus raised the levels of achievement of first year students to standards only previously expected of their seniors. If the results of students with initial differences can be brought closer together there is an indication that they differ in background factors rather than in inherited abilities. (20)

4. A Student's Orientation to University

Most of the classifications of student orientations which have been made identify similar groupings, as can be seen by comparing those of Tinto and Clark and Trow. (21) (22) Both distinguish two dimensions; commitment to college, and academic commitment. Tinto relates dropout to Durkheim's model of suicide, and suggests that dropout is also associated with poor integration. Clark and Trow use the two factors to obtain four subcultures: academic, collegiate, non-conformist and vocational. Beard has summarised other similar classifications, and shows how with appropriate models, methods and assignments all but the purely fun-loving collegiate can be helped to success. (1)

5. The Intellectual Climate

The work of Goffman and his theory of total institutions deserves more attention. He analyses the coercive, non-negotiable and non-consultative nature of many institutions. One characteristic of a total institution is that the Progress of information about staff plans for inmates is restricted, and inmates are excluded from decisions about their fate. (23) It is instructive to compare the description by Miller and Parlett of how an examination paper is constructed, presented to students, assessed and utilised. (24) It can be said that Goffman puts the Hidden Curriculum into perspective.

6. Conclusion

In 1974, Trow described a dimension of 'élite - mass - universal post-secondary education' along which, he asserted, the higher education systems of developed countries were all progressing. In spite of reduced growth, Trow sees no reason to revise this standpoint. Student demand and market forces will eventually dominate political and bureaucratic restriction. In a situation where higher education is geared to the cost effective production of graduates in large numbers emphasis will be placed first on the problems of mass attrition and economical ways in which large groups of students can be brought to success. For research on individual differences in learning to bring about improvements in student achievement, techniques must thereby be generated capable of general, non-specialist application. In the present climate, if a student in difficulty is to receive specialised attention, he must usually be an exceptional case. Our task is to ensure that he is. (25)

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A COMPARISON OF SCHOLASTIC APTITUDE AND PERSONALITY TESTS WITH A SCHOOL LEAVING EXAMINATION AS MEASURES OF SUBSEQUENT ACADEMIC PERFORMANCE

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Introduction

The manner in which students are selected for third level education is a matter of considerable public interest. While a considerable literature exists on the predictive value of school examinations, scholastic aptitude and other tests, little detailed research has been published for the Irish context other than Nevin (1974) and Moran and Crowley (1979). The former study is dated somewhat, being based on students who entered University College Dublin almost twenty years ago. The latter study was based on all students who were admitted to the six largest faculties at University College, Cork (UCC) in the two years 1972 and 1976, approximately 1800 students in all. That study considered in detail the relationship between performance at the first university examination (FUE) at UCC and the final national examination on leaving school (LCE). In particular it examined the optimality of the scoring system used for ranking applicants for entry including the question of differential weighting for particular subjects.

The study reported in this paper is based on a subsample of the students who entered UCC in 1976. It was designed to complement the larger study by providing comparative information on the relationship of university examination performance to variables other than school examination performance such as social and educational background, personality and scholastic aptitude as measured by various tests.

The present paper describes the findings for scholastic aptitude and personality.

2. Method and Data

For each of the five faculties, Arts, Commerce, Science, Engineering and Medicine at UCC a sample of 70 students was selected at random from those who had been accepted for entry to those faculties in Autumn 1976. The selected students were written to in September 1976 and the purpose of the project was explained. The students were invited to participate by first providing some basic biographical and educational information. Subsequently in the weeks immediately before and after registration a series of scholastic aptitude and personality tests were taken by the students. The original sample sizes were reduced somewhat by reasons such as some applicants ultimately deciding not to come to UCC. The final sample sizes for which complete data were obtained are presented for males and females in Table 1.

TABLE 1

Distribution of sample by faculty and sex

Faculty	Total number admitted in October 1976	Sample Size	Males	Females
Arts	381	56	24	32
Commerce	124	54	36	18
Engineering	109	59	56	3
Science	220	50	30	20
Medicine	77	63	40	23
Total	911	282	186	96

The total number of students in each faculty is also provided. The final total sample size was 282 as compared with an intended 350 representing an overall response rate of 91%. This is very high by comparison with similar studies involving volunteer participation (cf Moser and Kalton, 1971).

The data recorded on each student may be listed under three headings according to its source. (1) biographical and related information obtained from the students via the postal questionnaire, (2) performance on scholastic aptitude and personality tests as measured directly and (3) examination performances at the school and university examinations respectively as determined from College records. The details are as follows :

(1) The data from the postal questionnaire included sex, age, parity, family size, father's occupation, parent's education, area of home residence, secondary school attended and duration, satisfaction rating of second level education, work experience, source of finance, kind of accommodation, social activities, reason for going to university, level of degree sought.

(2) The tests administered to the students covered -

(i) Ability as measured by the Alice W. Heim (1968) (AH5) group test designed for use with intelligent subjects including potential entrants to university and the professions. It consists of two parts, verbal and numerical, the latter including problems in diagrammatic form.

(ii) Personality as measured by (a) the Edwards Personal Preference Schedule (EPPS) (Edwards, 1969), a forced choice inventory intended to assess the relative strengths of various manifest needs, and (b) Cattell's Sixteen Personality Factor Questionnaire, Form A (16PF), (Cattell, Eber and Tatsuoka, 1970) and (c) Shostrom's Personality Orientation (POI), (Shostrom, 1972).

(3) Performance at the LCE and FUE. The former was measured by the points score used for university entrance, the latter by either the result Pass/Non-pass or the actual mean mark of the first year subjects taken at pass level (cf Moran and Crowley (1977) for full details).

3. Analysis and Results

Perhaps the simplest way to look for a relationship between the various cognitive and personality variables and performance at FUE is to divide the students into two groups on the basis of pass/non pass in FUE and to compare the two group means. Obviously this must be done separately for each faculty as the criteria for passing in different faculties are not necessarily equivalent. The faculty groups were further subdivided by sex as a preliminary comparison of males and females revealed differences for some variables. On the EPPS scale, for example, males had higher scores on variables such as achievement, autonomy, dominance while females had higher scores on deference, affiliation, intraception etc. With the exception of deference, the statistical significant differences for sex were the same as those reported by Edwards (1959). On the POI scale the differences between sexes were consistent with those outlined by Saville and Blinkthorn (1976). Separate comparisons of pass and non pass students for each faculty and sex combination revealed few differences of statistical significance, but when the consistency of differences in terms of sign and closeness to significance is examined a definite pattern can be established for some variables.

With regard to personality, the components of EPPS which clearly emerged for all faculties and both sexes were achievement, endurance, order, succourance and affiliation. The first three are positively associated reflecting a personality who wishes for success, is willing to persevere in difficulty and likes to work in an organised and neat fashion. The last two as defined on the EPPS scale were negatively associated with FUE suggesting that students who pass tend to be self sufficient. Component G of 16PF and TC on the POI (the definition of these components are given in the Appendix) also featured prominently. The former indicating persistence and conscientiousness with adherence to the rules and the latter indicating an ability to concentrate on the here-and-now rather than worry about what might have been were both associated with passing FUE. In addition to the above, successful males had high scores on Q4 of the 16PF reflecting drive while successful females had low scores on component I of the same inventory indicating a tendency towards tough realism.

As far as the AH5 test of intelligence is concerned only the first or verbal component exhibited any difference between the pass and non-pass students. Moreover such differences as existed were sometimes in the wrong direction although admittedly non statistically significant. Points score on the LCE by comparison had the right sign in all instances and was usually statistically significant.

The analysis based on division of students into pass and non-pass groups neglects some information in that it ignores the margin by which each student passed or failed to pass as given by the actual first year mark. This is particularly true in the case of Medicine where the above analysis fails entirely in that all but two students passed. Correlation coefficients were, therefore, determined between the FUE mark and each of the predictor variables. The correlations have the further advantage of quantifying the relative degree of association for each of the variables. The leading coefficients are presented in Table 2. They confirm the results of the simple dichotomy into pass and non-pass and suggest some further variables which are associated with performance in FUE. On the EPPS scale these include, change or a readiness to try what is new, which was positively associated with passing FUE and nurturance and heterosexuality which

TABLE 2

Leading correlations between First Year University Result and Points Score, Cognitive and Personality Tests according to Faculty and Sex.

(See appendix for interpretation of abbreviations)

FACULTY	MALES			FEMALES		
ARTS		Ord	0.58*		Exb	0.49**
	EPPS	Het	-0.54*	EPPS	Aff	-0.46**
		End	0.38			
	16PF	Q4	0.39	16PF	O	-0.37*
		C	-0.36			
				POI	TC	0.47**
COMMERCE	Points		0.71***	AH	Verbal	0.52*
	AH	Verbal	0.44*	AH	Non-verbal	0.61*
	16PF	C	0.57**			
				16PF	I	-0.63**
				POI	TC	0.49*
SCIENCE	Points		0.85***	Points		0.80***
		Ach	0.61***		End	0.58*
		Aff	-0.57**	EPPS	Aff	-0.41
	EPPS	Nut	-0.50*		Chg	-0.41
		Het	-0.42*		Ach	0.38
		Suc	-0.36			
				16PF	I	-0.52*
	16PF	Q4	0.38			
		F	-0.39	POI	SR	-0.54*
					SP	-0.40
					ID	-0.38
ENGINEERING	Points		0.80***	(too few observations)		
	EPPS	Ach	0.35*			
	16PF	O	-0.44***			
		F	-0.36**			
MEDICINE	Points		0.49**	Points		0.46
		Het	-0.51**		End	0.51*
	EPPS	Ach	0.36*	EPPS	Het	-0.44
		Int	-0.35		Ach	0.38

were negatively associated. The latter that indicate that a lack of generosity in helping others and perhaps a rather limited involvement in social activities were associated with students who pass. On the 16PF scale, I again is prominent for females as is TC on the POI scale. Other variables on the POI which feature for females in the Science Faculty are SR and SP. They indicate that low self esteem and lack of assertiveness despite ability were associated with girls who did not pass the first Science examination. Other variables with correlations which appear in Table 2 will be seen to have interpretations consistent with results already quoted. The AH5 tests of intelligence again fare badly with reasonable correlations only appearing in the case of the Commerce Faculty. The highest correlation coefficients were associated with the LCE points score. Multiple regression analyses were undertaken to examine the joint association of various sets of predictor variables with the FUE result. Lack of space precludes a description of these analyses and suffice it to say that personality characteristics already discussed make a marginal contribution in all faculties. With the exception of Arts, where grades for diverse subject options within the faculty inevitably confuse the issue, the bulk of the predictive association is provided by the school leaving examination.

4. Discussion

One clear answer emerges from this study; the relatively strong association of the FUE result with the LCE result as compared to the poor association of FUE performance with score on the AH5 scholastic aptitude test. This result confirms entirely the conclusions of Powell (1973) based on all 2781 entrants to five Scottish universities in 1962. He found that the SAT test (Form ASAI, Education Testing

Service, Princeton, New Jersey, USA) was a very poor predictor of subsequent academic performance and cited other studies with similar conclusions. Scholastic aptitude tests are, of course, widely used in North America where no national school leaving examination exists and students have very diverse educational backgrounds. In contexts similar to Ireland, however, scholastic aptitude tests would appear to have little to offer.

Measures of personality, while inferior to the LCE as indicators of subsequent academic performance at FUE in all faculties other than Arts did nonetheless feature in a fairly consistent and, in retrospect, predictable way. Other personal characteristics of students such as sex and age also associated to a limited extent with subsequent examination performance. The use of such characteristics in selecting entrants to third level education raises serious political and social issues. What if an effective selection process discriminated between the sexes or favoured those with selfish or other socially undesirable instincts? The stability of personalities emerging from adolescence into young adulthood must also put some limitations on the use of such tests and it is difficult to see their public acceptance. It is possible, however, that variables unacceptable for purposes of selection might have a role for the purpose of guidance and counselling.

Our study in this area is, of course, based on only 252 students and a larger study would undoubtedly uncover more associations of statistical significance. Whether the strength of such associations is such to be of practical significance remains to be seen. For predictive purposes it will be difficult to improve on the LCE incorporating as it does a measure, albeit imperfect, of scholastic ability but also implicitly measures of non cognitive abilities such as application and motivation.

APPENDIX

Ach = Achievement : to do one's best

Aff = Affiliation : to be loyal to one's friends

Chg = Change : to do new and different things

End = Endurance : to keep at a job until it is finished

Het = Heterosexuality : to go out with members of the opposite sex

Int = Intraception : to analyse one's motives and feelings

Nut = Nurturance : to help friends when they are in trouble

Ord = Order : to wish things organised

Suc = Succourance : to wish sympathy and help from others

A : Outgoing (+) versus Reserved (-1)

C :: Calm (+) versus Easily upset (-1)

F : Heedless (+) versus Serious (-)

G : Conscientious (+) versus Expedient (-)

I : Tender-minded (+) versus Tough-minded (-)

O : Apprehensive (+) versus Self-assured (-)

Q4 : Tense (+) versus Relaxed (-)

ID = Inner-directed : Reactivity orientation towards self (+) versus towards others (-)

TC = Time competence : Living in present (+) versus excessive concern with past or future (-)

SP = Self perception : High self worth (+) versus low self worth (-)

SR = Self regard : Affirmation of self because of strengths and worth.

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COLLEGE SENIORS WHO WERE HIGH-RISK FRESHMEN: A LONGITUDINAL STUDY AT A SMALL, PRIVATE, FOUR-YEAR COLLEGE

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Introduction

Inadequately-prepared college freshmen are not a new phenomenon. In 1825 Philip Lindsley, president of the University of Nashville, complained that "not one youth in ten is thoroughly prepared" (Hofstadter and Smith, 1961), and similar comments have been expressed numerous times over the years since then. Thus it is surprising that with so much attention paid to their entering deficiencies, so little is known about those who remain in college and graduate. Despite interest in development of college students in general, this writer located only two dissertation studies between 1952-1981 that included the views of college seniors who had been high-risk freshmen, defined by the ERIC Data Base as "students, with normal intelligence, [sic] whose academic background or prior performance may cause them to be perceived as candidates for future academic failure or early withdrawal." Thus high-risk freshmen persist or withdraw, encounter or do not encounter the developmental stages of other college students, achieve or fail, find satisfactions or frustrations, learn or mark time, all in near oblivion, save for their unimpressive entering records and the remediation programs designed to help them. Yet findings about those who succeed should be of interest, particularly now, as colleges face a shrinking pool of available freshmen and are likely to consider admitting more high-risk students. Without a better understanding of the experience of successful high-risk freshmen, without indications of instructional and developmental factors that may facilitate their persistence, without records of how many and what types remain in college, educators are not equipped to make such decisions.

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Research Design

The following research was conducted to fulfill requirements for a Doctor of Philosophy degree in higher education, conferred in May 1982 by the University of Iowa.

The objective was to describe, through college records, interviews, and questionnaire, the college experience of seniors who had been high-risk entering freshmen and to identify developmental and instructional factors they perceived as influential in their persistence in college.

The sample was composed of 52 Central college seniors who had below-average academic records as fulltime entering freshmen at Central College in Pella Iowa in the fall of 1976. Data came from college records, interviews with 32 of these seniors, and responses to the "Student Opinion Survey" by those interviewed. Transcripts of the interviews were analyzed, and factors identified by these seniors as influential in their persistence were classified as developmental or instructional. Developmental factors were defined as areas of growth in terms of vectors identified by Arthur W. Chickering (1969): developing competence, managing emotions, becoming autonomous, establishing identity, developing interpersonal relationships, clarifying purposes, and developing integrity. Instructional factors were experiences designed by the college to advance student growth, congruent with the institution's purpose.

In order to better understand students in the sample, they were classified into three academic types: (1) LOW ACT STUDENTS were from the upper half of their high school graduating classes, but had ACT composite scores of 17 or lower. One might assume that they were more diligent than the other two academic types; (2) LOW RANK STUDENTS scored above 17 in their ACT composites. However their high school class ranks were in the lower 50%. One might assume that they were quicker of mind, but less motivated than the Low ACT students; (3) LOW ACT AND RANK students were from the lower half of their high school classes, and they also scored below 18 in ACT composites. One might assume that they were weak candidates for college academic work but with some strength not readily indicated by ACT scores or class rank percentiles.

Following a survey of the literature, the findings in this study were related principally to the theories of Alexander Astin and Jerome Bruner in persistence, to Arthur Chickering and Nevitt Sanford in development, and to Patricia Cross, Martha Maxwell, and the late Mina Shaughnessy in instruction.

An exploratory research design was chosen for this study because of its usefulness in describing a phenomenon where not much is known. It allows a writer to examine a rich and diverse variety of data relating to the research objective in a broader context than would be possible in using formal hypotheses. Moreover, since these data concerned happenings that had already taken place, it was unlikely that independent variables could have been controlled. The findings, however, should generate hypotheses for more specific research of an analytical nature.

The Site of the Study

Central College, where the research was conducted, is a four-year, accredited, private, coed, Liberal Arts 1 college in Pella, Iowa. It is affiliated with the Reformed Church of America and offers 35 majors toward a bachelor of arts degree. It is globally oriented, and usually half of the students who graduate have studied at one or more of Central's six foreign centers. The college is characterized by a strong academic program, a commitment to communication skills standards and assistance, and to retention efforts.

In 1975 faculty, concerned about deficiencies in student reading, writing, and oral skills, began a comprehensive skills program with four components: (1) departmental communication skills standards for graduation; (2) a computer-assisted monitoring system that assesses all students' reading, writing, speaking/listening, and study skills each term; (3) a free peer-tutoring center; and (4) summer workshops that train faculty in teaching communication skills in their content area courses, with the result that two-thirds of Central's faculty have now participated in such a workshop.

At the end of each term, when professors turn in grades to the registrar, they also turn in an evaluation of each student's communication skills proficiency to the coordinator of communication skills. These and other data are studied, summarised by a single coding for each of the four skill areas, and entered into the computer. It promptly goes, by printout, to the student's advisor before advising conferences are held. Advisors are kept informed of some 125 content courses that stress specific skills so they can guide students into the courses they particularly need.

The college has also taken steps in the last six years to increase student retention through a number of strategies, but particularly through encouraging faculty to be more demonstrative in showing interest in and expressing affirmation of students, and more assertive and intentional in carrying out programs and services to those in need of them. Thus at the college, students find an environment conducive to their getting help and support when they need it in order to persist, to develop, and to achieve.

Some Findings About the College Experience

APPLICATION FOR ADMITTANCE: High-risk students who made application to enroll in college early were more apt to persist in college than those who applied later, and the difference was significant at the .05 level.

FRESHMAN RESPONSES TO COLLEGE: During the first week of college the interviewed seniors recalled that they were most often fearful. Other feelings named were: eager, intimidated, confident, isolated, and confused.

PERSISTENCE: In the fourth year after the high-risk freshmen enrolled, 52 of the 139 high-risk freshmen were seniors, a persistence rate of 37.4% (36% for Low ACT students, 35% for Low Rank students, and 41% for Low ACT and Rank students).

WITHDRAWALS: Of the high-risk freshmen who eventually withdrew from college, slightly more than half were not in academic difficulty at the time, and many of them apparently reentered college elsewhere, since almost half had requested that their grade transcripts be sent to other accredited institutions. Most of the withdrawals occurred during the first two years of college.

TUTORING: Seventy-seven percent of the seniors had received tutoring at some time, and those interviewed gave tutoring a mean satisfaction level of 4.41 on a scale of 1 (very dissatisfied) to 5 (very satisfied).

HELPFUL INSTRUCTION: When asked what they found helpful when they had "a particularly tough course," the interviewed seniors, choosing from a list of 11 items, most often singled out: (1) the efforts of faculty to provide opportunities for students to interact with the professor and with each other in class, and (2) faculty who provided alternative ways to achieve course goals.

RESOLVING SKILLS PROBLEMS: Seventy-five percent of the seniors had resolved serious communication skills deficiencies within the first three years.

HONORS: Four of the seniors received departmental recognition at graduation, and another was named to *Who's Who Among Students in American Universities and Colleges*.

MAJORS: The 52 seniors were represented in 19 of the 35 majors offered by the college, though 53.9% were clustered in four of the majors: business management, communication, elementary education, and sociology.

LEADERSHIP: Almost half of the seniors had held leadership positions.

GRADUATION: Thirty-four of the 52 seniors received degrees at Central College in May 1980, 24% of the original 139 high-risk freshmen. By the 1981 commencement, 33.8% of the high-risk freshmen had graduated at Central, and probably some others elsewhere, judging from the "Withdrawals" finding. (34.5% of the Low ACT students had graduated from Central, 29.7% of the Low Rank students, and 36.4% of the Low ACT and Rank students.)

GRADES: The four-year mean grade point average was 2.567 on a scale of A:4. A term-by-term analysis of GPA means showed a general increase over the four years, but with numerous fluctuations. Special mention was made of one particularly diligent student in the sample who entered college with an ACT composite of 12, a high school class percentile rank of 40, a reading percentile of 33, and a high school grade point average of slightly above a "C". She graduated with the third highest GPA among the 52 seniors, attaining a 4.000 GPA fall term of her senior year while carrying a course overload. She was named to the dean's list four out of her last five terms.

Developmental Factors

When the 32 interviewed seniors were asked to name areas of "much growth" during college, choosing from Arthur W. Chickering's vectors of human development, the areas received the following percentages, listed in rank order of frequency of mention: achieving competence (65.6%), developing interpersonal relationships (56.3%), becoming autonomous (46.9%), developing integrity (40.9%), establishing identity (40.6%), clarifying purposes (37.5%), and managing emotions (34.4%).

Instructional Factors

When the 32 interviewed seniors were asked to select influential factors in their areas of "much growth," choosing from a listing, the factors mentioned by 50% or more of them were: For achieving competence--the maturing process, Central faculty/staff, Central student, and a campus atmosphere defined by the student. In an earlier question, the students were asked to name two or three persons at college who had been an influence on them, and they singled out one-third of the faculty by name, as well as some administrators, staff, and other students. Qualities they particularly valued in faculty/staff were those of being capable and empathic, reaching out to them as individuals, helping them, respecting them and their ability to grow, to mature, and to learn, often becoming friends as well as mentors. Their mean level of satisfaction with the faculty attitude toward students was 4.19 on a scale of 1 (very dissatisfied) to 5 (very satisfied). For the vector, developing interpersonal relationships, the interviewed students named: group activity, Central student, friend, campus atmosphere defined by the student, and the maturing process.

Their Overall View of College

ADVICE TO HIGH-RISK FRESHMEN: When the 32 interviewed seniors were asked what advice they would give to freshmen just like themselves four years ago, they gave the following suggestions which have been summarized: (1) set academic goals, and plan college work carefully; (2) study well, and learn how to manage your time; (3) be open to new people and experiences in college, but don't let social times undercut your long-range goals; (4) keep perspective, and don't make rash decisions when discouragements come; (5) face up to the future impact of your problems, and take responsibility for resolving them; (6) learn the system in order to accomplish your goals, and protect your interests.

SATISFACTIONS: The 32 interviewed seniors indicated their satisfaction with the following aspects of college life, on a scale of 1 (very dissatisfied) to 5 (very satisfied): satisfaction with class size relative to the type of course (4.16); satisfaction with instruction in major field (4.13; satisfaction with the college in general (4.03); satisfaction with the variety of courses offered by the college (3.66); satisfaction with the testing/grading system

(3.66; and satisfaction with concern for you as an individual (3.59).

Concluding Comments

The 1980 college seniors who had been high-risk freshmen at Central College overcame many hurdles during their four years, while facing the same academic and developmental tasks of other students, in all probability. Yet this study shows that over a third eventually attained a degree from Central, often after an additional year of study, and almost half who withdrew apparently continued their education elsewhere. The seniors identified major growth areas during college as achieving competence and developing interpersonal relationships, with a number naming much growth in autonomy as well. They were quick to pay tribute to faculty-staff persons and fellow students who played an influential role in their growing maturity and competence.

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SOCIAL AND AFFECTIVE FACTORS OF SUCCES AND FAILURE AT UNIVERSITY

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1. Introduction

In 1976, the Free University of Brussels founded the research-unit EDUCO. Main goal of EDUCO was to enhance a number of inter-disciplinary activities to bridge the gap between secondary school and university. A first cognitive approach consisted in improving the mastering of the study-material and correcting gaps of knowledge by 'bridging courses', in which C.M.I. and C.A.I. was thoroughly applied (RIGAUX 1980, EISENDRATH 1979, JACOBS 1982).

A second approach was started in 1979 and stressed the importance of affective and social elements while moving from secondary school to university. Some preliminary results of this second approach were presented at the 8th UIT-conference (VAN OVERWALLE 1982). More recent outcomes of two years of research will be presented in this paper.

At this stage we only decribe and structure all relevant affective and social elements that affect student-achievement. We don't give causal interpretations yet, since this is the purpose of further research. We nevertheless try to find new relevant elements that can also be used as tools for remedial purposes. In this attempt we prefer to deal with daily-life experiences of the students. Therefore, we extensively put our efforts in interviews with the students, as contrasted with more formal approaches like attitude- and personality-scales or questionnaires.

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* in collaboration with the Director-general E. BAETEN of the Ministry of Education

2. Method

Data :

1 - Information about family-background and secondary school.
2 - Interview about integration at university, after the first half-year.
3 - Interview about studying and examinations, after all the examination-sessions.

Sample :

Of 102 students, 96 were interviewed a first time (integration), and 60 were contacted a second time (examinations). All of them were first-year students in the academic years 79-80 and 80-81.

Instruments :

Most research on this topic, includes questionnaires and tests to predict student-achievement. This approach has the main disadvantage of only selecting questions relevant from the point of vue of the researcher. The students' experiences in their individual context are neglegted.

That's why we used interviews right from the beginning of our research. In our point of view, innovations and new views in this research-area can only come from this student-directed approach. The information out of these interviews led to the construction of interview-scales, which can serve now to formalize this information in discrete and ordered categories (see some examples on table 1).

Global attitude and personality ratings were also asked of the interviewer and of the student, to complete the information of the interviews.

TABLE 1

note :

- The higher the ranknumber af the interview-scale, the better outcomes at the end of the first year.
- These interview-scales are constructed in our second research (n=30). Since the interviews are weakly structured, we do not always have enough information to code all the students for every scale.

(continued)

1. reactions of other people on studychoice (r=.87; n=24)

1 - My parents, teachers or some other people discouraged (one of) my original studychoice(s). They told me that it would not suit me.
2 - My parents, teachers or some other people told me that (one of) my original studychoise(s) could suit me, but an other choice would be better.
3 - Everyone agreed with my final studychoice.
4 - I mainly received information from my parents, teachers or other people.
5 - I received information from some people, which I completed by conversation about my futur study with students or graduates that I know.

2. study-interests of my parents (r=.68; n=29)

1 - My parents don't care much about my studies. They have no time or don't understand why I want to study at university.
2 - At least one of my parents encourages me or advizes me in practical matters, shows interest in my experiences and outcomes at university. But we dont't talk much about the study-matter.
3 - At least one of my parents stimulates and supports me, helps me for practical purposes (e.g. typing) or talks and advizes me about the study-matter.

3. contacts with students (r=.79; n=29)

1 - I have no friends or the people I know are not stimulating. The general atmosphere with the students of my study-year is not nice, everyone sticks to himself.
2 - One to three students are good friends.
3 - I am acquainted with a group of more than 3 students, but I have little social contact with other students.
4 - I am acquainted with a group of more than 3 students and/or I have rather good social contacts with the students of my year.

3. Statistical analysis

As a criterion of student-achievement, 8 categories ranking from low to high achievement were used. These ordered categories are a combination of drop-out and grade. First of all, this approach seems to be more differentiated than the pure distinction between succesful and unsuccesful students. And secondly, the use of the obtained marks is insufficient since then dropouts are not taken into account.

Since the criterion, the global ratings and the interview-scales are of ordinal measure-level, we use non-metric statistical methods to analyse our data.

1 - Rankcorrelations of SPEARMAN. To decide whether a predictor is relevant or not, we apply a significance-level of $\alpha=.05$ (2-tailed).

2 - Smallest space analysis (MINISSA) of GUTTMAN & LINGOES (1973) was used to plot all the significant predictors and the achievement-criterion in a 2-dimensional space, which allows us to look for relations and structure in our data. In this space, variables are represented as points. The closer the two points, the higher the correlation between them.

3 - Confirmatory monotone distance analysis (CMDA) of BORG & LINGOES (1980) allows to confirm or reject our hypothetical structure in the data and MINISSA-plot. We draw our hypotetic structure by means of
   - circels to separate low, medial and high predictors,
   - straight lines to split up 'weak-contiguity type A' regions (LINGOES 1981) of highly intercorrelated predictors.

This overall structure is for the most part confirmed, but is not identical with the original MINISSA-plot (table 2).

TABLE 2

	after 1° half-year	after exams
alienation MINISSA	.294	.342
CMDA	.308	.358
difference	+.014	+.016
probability [1]	$.12 \times 10^{-2}$	$.14 \times 10^{-7}$
L-W correlation [2]	.967	.935

[1] A small probability indicates a real difference between MINISSA (no constraints) and CMDA (with constraints).

[2] LINGOES-WOODROOFE correlation between MINISSA and CMDA.

4. Results

Student-achievement at university shows many different causal relations. We here give a review.

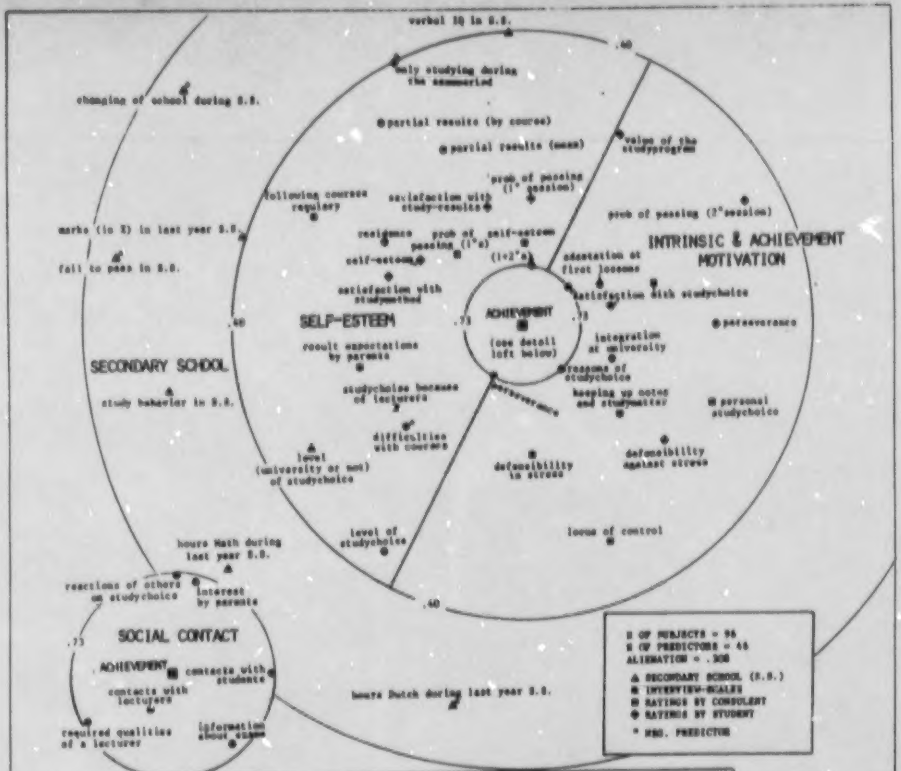
verbal IQ in S.S.
.40
only studying during the semesterend
changing of school during S.S.
partial results (by course)
partial results (mean)
value of the studyprogram
prob of passing (1° session)
following courses regulary
satisfaction with study-results
prob of passing (2°session)
marks (in %) in last year S.S.
residence
prob of passing (1°s)
self-esteem (1+2°s)
adaptation at first lessons
INTRINSIC & ACHIEVEMENT MOTIVATION
fail to pass in S.S.
self-esteem
satisfaction with studymethod
satisfaction with studychoice
.40
SELF-ESTEEM
.73
ACHIEVEMENT
(see detail left below)
.73
perseverance
result expectations by parents
integration at university
SECONDARY SCHOOL
reasons of studychoice
studychoice because of lecturers
perseverance
keeping up notes and studymatter
study behavior in S.S.
personal studychoice
difficulties with courses
defensibility in stress
defensibility against stress
level (university or not) of studychoice
locus of control
level of studychoice
hours Math during last year S.S.
reactions of others on studychoice
interest by parents
.40
SOCIAL CONTACT
.73
ACHIEVEMENT
contacts with students
contacts with lecturers
hours Dutch during last year S.S.
required qualities of a lecturer
information about exams
N OF SUBJECTS = 96
N OF PREDICTORS = 46
ALIENATION = .308
▲ SECONDARY SCHOOL (S.S.)
■ INTERVIEW-SCALES
● RATINGS BY CONSULENT
◆ RATINGS BY STUDENT
* NEG. PREDICTOR

FIGURE 1 SECONDARY SCHOOL & FIRST HALF-YEAR AT UNIVERSITY : SPATIAL PLOT OF SPEARMAN CORRELATIONS (α ≤ .05) WITH REGIONAL CONSTRAINTS

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1. Before university (fig. 1)

The first, direct indications of study-achievement at university come from secondary education. Cognitive influence on performance at university. These outcomes constitiute at the most a background for the real causes of study-achievement, which lie in the first year at university.

2. First half-year at university (fig. 1)

One of the most important predictors of study-achievement is the way in wich a student copes with his personal experiences at university : how does he evaluate his own capacities and chances on succes (self-esteem), and how much is he motivated towards his subject. Self-esteem of own capacities and chances are higher predictors of final outcomes, than marks obtained from half-term examinations. Studymotivation at the first half-year at university includes intrinsic motivation (interest in the subject) and achievement motivation (perseverance and effort to achieve a good result).

The students evaluation of his own capacities is probably also based on study-results of secondary education, as contrasted with study-motivation of which we could not find any relevant item before university. Maybe this gap explaines why prediction of study-achievement at university, only based on data of secondary school, remains little accurate. Up till now, we were unable to examine this problem thoroughly, since different tests are used to measure the study-interest at the end of secondary school.

The most critical predictor during the first term, however, is the attention and support from others with his study, and the social contacts with academic personnel and students at university. If the critical weight of this social factor will be confirmed in further research, one can conclude that students' failure is not as much due to insufficient capacities or motivation, as to inability to integrate sufficiently into the new, unknow social environment. Social contact though, can also be an indication, rather than cause of succes/failure at university.

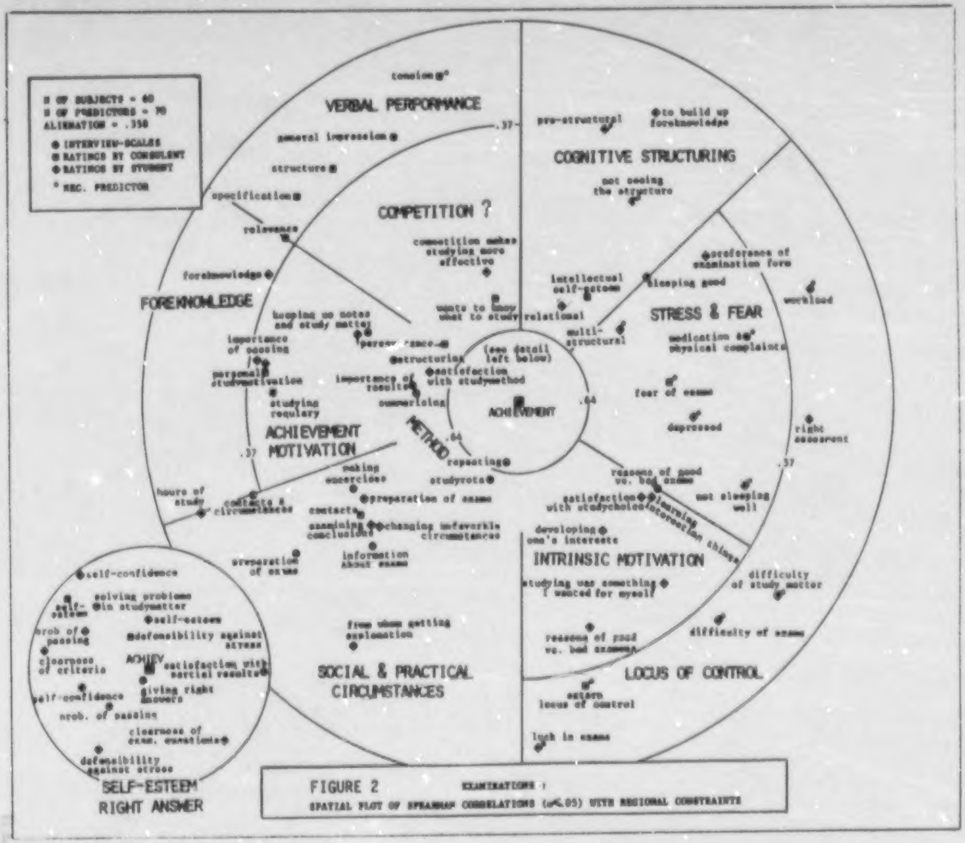

FIGURE 2 EXAMINATIONS :
SPATIAL PLOT OF SPEARMAN CORRELATIONS (α≤.05) WITH REGIONAL CONSTRAINTS

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3. Examinations at university (fig. 2)

What are the significant determinants of failure or succes during examinations ? Factors that can help a little are a fluent verbal performance at examinations, and an internal locus of control, such that the student thinks of himself as being responsible for succes or failure.

During examinations, emotional factors become more important. Are circumstances optimal for study (calm and supportive environment)? Does the student still like his subject (intrinsic motivation)? Is he working hard to pass (achievement motivation)? Can he manage stress and fear for exams ? As important as emotional factors is his ability to learn and to structure the study-matter (cf. SOLO-taxonomy of BIGGS 1979). The best way to achieve this goal is by adopting a systematical and structured study-method in preparing and studying the study-matter.

Less surprising perhaps is self-esteem and knowledge of the right answer as most critical predictors of study-succes. It is rather easy to understand that the more exams the student prepares and makes, the better he evaluates his chances to succeed. In this context self-esteem also includes an emotional component : the student becomes more or less self-confident. It is also interesting to notice that many students don't know right aswers and fail because of their lack in solving all problems in the study-matter, their lack of reliable information about examination and criteria used by lecturers to evaluate their answers.

5. Conclusions

1. Prediction

Many researchers try to find a meaningful structure of so-called significant items of study-succes by factor-analysis or related methods. As a consequense, one knows little about the real relevance of those items at the explanation and prediction of study-achievement at university. One example : only 10 of the 42 items of the 'Lancaster inventory of approaches to learning' (ENTWISTLE 1979) we included, had significant correlations with student-achievement.

2. Specificity

In many researches one tries to predict and explain study-achievement by general personality or attitude scales. We also used this approach, but in all cases we obtained poor results, probably because general personality or attitude scales are intended for a large range of social situations. Succes or failure at university, however, is a rather typical problemsituation of first-year students. The richer quality and higher correlations of most interview-scales confirm the better results from this latter approach. An illustration : the personality-factor introversion/extraversion does not correlate with student-achievement, while the interview-scale about social contacts with students had quite a high correlation (.79) with achievement.

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LEADERSHIP DEVELOPMENT: A PROGRAM FOR SELF RENEWAL

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The Academic Leadership Development Program (ALDP) has been in operation in Texas Tech University since 1980, directed primarily toward the personal and organizational development of Academic Administrators. The pool of participants has included central administrators, deans and associates, department chairpersons, directors and faculty serving as principal investigators on research projects. The program was initiated by individuals within the administrative structure to develop more effective leadership and management of resources in identifying and achieving the academic goals of the university. Specific objectives for meeting the goals of the program were developed through continued discussions of a group key personnel which was formed as an advisory board within the institution.

Papers from an international conference on professional development held in Thailand in 1982 would appear to confirm that the needs and goals identified for staff development are similar to those current in higher education in other areas of the world. For example, an institution in South Africa indicates that it has leadership seminars for heads of departments and that the courses include interpersonal communication skills, effective use of time, and staff morale (team building).[1] Specific workshops have been held in these same areas on this campus as a result of needs identified by the advisory committee. For an institution in the United Kingdom it was indicated that three aims of professional involvement included job satisfaction of academic staff, improvement of career potential, and enhancement of professional competence (some combination of range, depth and performance).[2] The universal aspect of these desires for staff development programs was emphasized by a writer from another institution on the other side of the world. Dr. Somkid Kaewsonthi, describing the program at Chulalanghorn University in Thailand, indicated that the professional development program there is to stimulate both human relationships and a team approach to administration.[3] It is of some interest that in these four widely separated areas of the world, recognition of need for professional development have manifested themselves in programs with similar aims and, in some cases, quite similar activities. The identified needs support the findings of an extensive publications survey in planning management development.[4]

Development

The first two years of the program at Texas Tech University involved planning and conduct of a number of workshops as well as establishing ongoing mechanisms for maintenance of the program. As an Advisory Board was established, support from central administration was gained and a structure was developed. The support of the President of the University was obtained and his participation in some of the programs helped to emphasize the importance of the effort. The involvement of the chief administrative officer in administrative improvement programs has obvious value.

The potential participants were involved through survey responses in identifying areas of need. The planning group, i.e. advisory board, then translated those identifications into workshop topics and study activities. The activities were developed by establishing objectives, identifying individuals with expertise in the topic area (and designating these individuals as leadership associates - as a status identification and to deepen their involvement with the program) developing an instructional module, training those to conduct the activities, and publicizing, conducting and evaluating the results of workshops. For every area addressed there were a number and variety of participants, since participation was on a voluntary basis, who represented a rather broad cross section of the institution.

The Advisory Board continued to involve itself with purpose, conduct and evaluation of the ALDP. Faculty of the institution were called upon for their expertise in approaching organizational change. For example, an individual directly concerned with management training made a presentation to the board as did professors in the area of management whose primary concerns were organizational change. In addition to the review of theory and practice related to administrative leadership development, the Board also reviewed published training or development materials. For example, the Higher Education Management Institute materials on management development provided substantial information.[5] Commercially developed programs and private management consulting firms were weighed as to cost and benefit in comparison of in house program development. The latter course was adopted as the most advantageous approach. The Board deemed it worthwhile to develop the internal ability of the institution to conduct and provide continuity for its own leadership development program.

As a result of the study efforts, several areas were chosen for development. These included: roles of the academic administrator, communications, goal setting, performance appraisal, time management, planning, motivation, and program evaluation. In addition, a sequence of activities was adopted as an approach to be applied to each topic. This included: the establishment of specific learning objectives, contracting with an expert in the identified area to develop an instructional module, a training session (by the developer of instructional module) to prepare other leadership associates for the conduct of the workshop, publicization of the workshops, conduct of the activity, and assessment from feedback from the participants.

As the program got underway the ALDP also sought and brought to the campus outside experts to work on the topics of academic planning, motivation, and conflict management. Since some external funding existed for the ALDP for the first two years of its operation, additional activities were undertaken. These included, in addition to sponsoring workshops, provision for travel for members of the advisory board and the leadership associates to attend leadership conferences away from the campus. A small resource library was established and a newsletter begun.

From participant evaluation it was evident that administrators saw benefits in the opportunity to interact with others across campus and for the opportunity to develop and improve leadership/managerial skills.

Change and Operations

As the external funding for the first two years terminated the program was put to a test, i.e. whether participants were sufficiently interested to conduct the activities in addition to their regular duties. The Advisory Board and the Associates (who had been involved in the earlier training and planning activities) chose to attempt to continue the program. The direction of the activity was shifted to the Vice President for Academic Affairs who stressed his interest, but cautioned that funding would not be available for consultance or for other aspects of the program. The advisory personnel continued to devote time to the activity, however, and the third year of the program took shape in planning. One dean allowed the shift of part of the duties of a professor with particular interest in the program and with a management consulting background, so that the individual could spend more time in planning and attending to details of arranging workshops for the year. Members of the Advisory Board developed and made workshop presentations. The Academic Affairs office publicized the activities through various means. As a result of the varied assistance, the series of leadership development activities continued without change noticeable by many of the participants. For those involved in producing the activities the changes required larger commitments of time and energy, but may have had a desirable effect of developing a closer network of involved administrators with more or less common goals.

One result of the changed approach was a sharpened focus of the program for the current year. Rather than attempting to meet a diverse set of objectives with a variety of approaches, the workshops for the year addressed a limited set of goals. The goals chosen were those which would approach the expressed needs of the largest number of individuals, and of those new to their position such as new chairpersons.

The Setting

Monthly workshops, opened to all academic administrators, were planned in varying formats. The workshops varied between participative, case study approaches and informational, presentation type meetings. Meeting times and locations were purposely varied to facilitate board participation. The changed locations allowed and encouraged participants to become familiar with buildings and areas of the campus with which they might not have occasion to visit. Since a Health Sciences Center shares the campus with the University, it was felt to be particularly important to encourage interaction between the two. Opportunities to meet in each others facilities afforded additional visitation possibilities.

Announcements of the meetings were made through administrative channels, and publicity through the student newspaper - both as announcements and as news stories - helped to develop awareness. Memoranda and notes attached to other campus mailings were used to announce workshops and advisory board members were asked to publicize the various activities. Particular activities of a continuing nature were selected for administrators new to their positions within the past year. A bi-polar workshop, for example, was conducted as a series of sessions with the same participants and facilitators. This helped to induct and develop a group of departmental leaders with close professional, and in some cases personal, ties. Other activities, which had been popular in prior years were repeated in a slightly different format. For example, a concern for performance appraisal has resulted in the conduct of different activities. A variety of administrative roles have been represented in the consideration of this topic. Performance evaluations have been considered for teaching staff and for administrative staff as well.

The voluntary and sustained effort has resulted in the conduct of some dozen activities per year involving participants on a voluntary basis. In addition, some selected activities have been conducted for members of the advisory group.

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Reevaluation

The desirability of provision of opportunities within higher education for improvement of academic leadership is hardly open to question. Better technical skills of managerial nature as well improved skills in human relations to be applied to the solution of higher educations problems are needs with logical validity. Staff development programs are supported in the literature and by prestigious commissions through a variety of descriptions. For example, the National Commission on Higher Education Issues has recently issued a report entitled "To Strengthen Quality in Higher Education". The report suggests that institutions "should devise and implement regular procedures for evaluating academic administrators", and further indicates a need for "professional development of the incumbents ..."[6]. It has been pointed out that in diverse institutions around the world the goals of staff development have related to improvement of technical skills and personal characteristics. The quality of post secondary learning and teaching seems to be directly related to enchanced institutional environments which are in turn are affected by academic administrators. Continued professional development of those academic administrators thus has close relationship to improved instruction at the post-secondary level.

The complexity of the leadership function in academic administration is frequently detailed. The importance of situational variables has come to be more frequently mentioned.[7] Provision of a limited number of workshops or study activities could not be expected to develop many of those necessary conditions for success, the difficulty in evaluating the impact of a program such as the one described is obvious. There appear to be some universals in this aspect of staff improvement programs as well. For example, Professor Kaewsonthi indicates for a Thai university that it "has not found a satisfactory way to assess the outcome for staff development activities, but it does endeavor to review past events and to improve its performance each year".[8] The ALDP finds itself in a similar situation, and relies upon participant evaluation and subjective assessment. The difficulty in assessment is evident since continuing involvement of concerned professional staff in attempts for self improvement are aimed not only at improving administrative behavior but ultimately the impact and effectiveness of the university.

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RESULTS OF AN ADMINISTRATOR CAREER DEVELOPMENT PROGRAM

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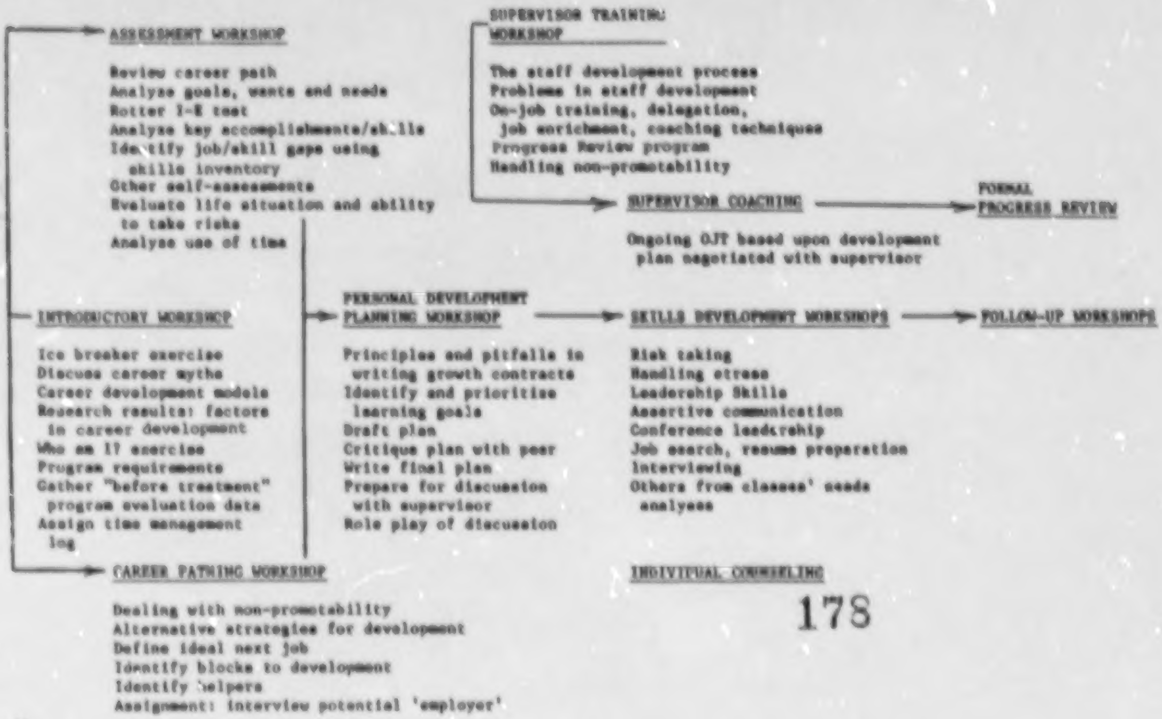
INTRODUCTION

In 1980, I reported one university's attempt to evolve a workable career development program for administrators (Bare, 1980). That paper summarized the knowledge gained from three program evaluations conducted during a four-year period. It concluded by describing an improved program to be offered during 1980-81. Today, I'm pleased to report our evaluation of the improved program.

PROGRAM DESCRIPTION

The administrator career development process is illustrated in Figure 1. The introductory workshop is followed by a series of full-day workshops at monthly intervals. The workshops provide guided experience in self-assessment, career pathing, self-development planning, and specific skills identified by the participants as essential to their mobility or growth. Each participant makes a commitment at the outset to attend all the workshops, to produce a personal development plan and discuss it with her supervisor, and to take some self-development actions on her own behalf.

Content of the workshops recognizes the lack of vertical mobility at the university. Alternative



ASSESSMENT WORKSHOP

Review career path
Analyze goals, wants and needs
Rotter I-E test
Analyze key accomplishments/skills
Identify job/skill gaps using
skills inventory
Other self-assessments
Evaluate life situation and ability
to take risks
Analyze use of time

SUPERVISOR TRAINING
WORKSHOP

The staff development process
Problems in staff development
On-job training, delegation,
job enrichment, coaching techniques
Progress Review program
Handling non-promotability

SUPERVISOR COACHING

Ongoing OJT based upon development
plan negotiated with supervisor

FORMAL
PROGRESS REVIEW

INTRODUCTORY WORKSHOP

Ice breaker exercise
Discuss career myths
Career development models
Research results: factors
in career development
Who am I? exercise
Program requirements
Gather "before treatment"
program evaluation data
Assign time management
log

PERSONAL DEVELOPMENT
PLANNING WORKSHOP

Principles and pitfalls in
writing growth contracts
Identify and prioritize
learning goals
Draft plan
Critique plan with peer
Write final plan
Prepare for discussion
with supervisor
Role play of discussion

SKILLS DEVELOPMENT WORKSHOPS

Risk taking
Handling stress
Leadership Skills
Assertive communication
Conference leadership
Job search, resume preparation
Interviewing
Others from classes' needs
analyses

FOLLOW-UP WORKSHOPS

CAREER PATHING WORKSHOP

Dealing with non-promotability
Alternative strategies for development
Define ideal next job
Identify blocks to development
Identify helpers
Assignment: interview potential 'employer'

INDIVIDUAL COUNSELING

Figure 1. Career Development Program Elements

development strategies, such as lateral mobility, job enrichment, and off-the-job learning opportunties are stressed.

The workshop series is open-ended. Additional training in career management skills is provided depending upon needs identified during the program. To deal with expressed feelings of "burnout," modules on coping with stress are included.

Since they represent an important source of assessment information, and since they control on-the-job learning opportunities, participants' supervisors are involved in the program. Each participant invites her supervisor to a half-day workshop in techniques for developing staff on the job. Later in the program, each discusses her personal development plan with the supervisor and enlists the supervisor's help in providing learning opportunities on the job.

As shown, individual career counseling is provided in parallel to the workshop and on-the-job elements.

Follow-up workshops are conducted six months after the series ends. During these workshops, participants are asked to report on their accomplishments, to share the results of their attempts to find mentors and build networks, and to provide additional information used to evaluate program impact.

Enrollment was restricted to exempt (professional) staff. Of the 60 persons who volunteered for the program, 52 completed the entire 18 months (18 men and 34 women).

RESEARCH GOALS

This study had two goals: (1) to measure program impact and (2) to discover which administrators benefitted most.

RESEARCH METHOD

At the outset of the first workshop, each participant completed four survey instruments:

1. A Personal Development Practices Survey. This questionnaire asks each respondent to list whatever she is doing to enhance her personal development. (Personal development is defined as improving technical and interpersonal skills, improving feelings of competence, improving mobility, advancement and job success.) Responses are solicited in five categories of activity that our previous research suggested could encompass most personal development effort: (1) off-the-job hobbies or money-making activities, (2) getting on-the-job training or coaching from the supervisor, (3) getting one's job upgraded or "enriched," (4) seeking another job within the university, (5) seeking a new job elsewhere. This data provides a base-line measure of each participant's self-development activity before entering the program.

2. The On-the-Job Development Questionnaire (Bare, 1981). This instrument measures organizational supports to employee development, such as supervisory delegation and training practices, on-the- job development opportunities, reward practices, etc.

3. The Job Diagnostic Survey (Hackman and Oldham, 1980). This questionnaire measures the respondent's needs for "psychological growth" and the extent her current job meets them.

4. A brief demographic questionnaire to record age, sex, education, length of service, time in grade, and salary level.

At the end of the program, each participant completed a second Personal Development Practices Survey. At this time they listed: (1) specific actions taken to foster personal development since entering the program and (2) actions planned between the end of the program and a follow-up workshop scheduled six months later.

RESEARCH HYPOTHESES

The study tested four hypotheses:

1. That the participants would increase the number of specific actions taken to foster their development.
2. Persons having high levels of frustrated growth needs, as measured by the Job Diagnostic Survey, would initiate more activity than persons more satisfied in their current jobs.
3. Persons having supervisors amenable to on-the-job training, job enrichment and coaching, as measured by the On-the-Job Development Questionnaire, would initiate more self-development actions.
4. Persons having longer time in grade, lower rates of advancement, and those plateaued in higher salary ranges also would initiate more new activities.

METHOD OF ANALYSIS AND FINDINGS

To evaluate the impact of the program generally, the number of developmental activities reported by each participant before the program was compared to the number reported at the end. The results, produced by the paired T-TEST procedure of the SPSS computer program are presented in Figure 2. The figure shows a significant increase in all five categories of self-development activity at the end of the program.

Figure 2
Impact of Program on Administrator Self-Development Activity

	Means			
Strategy	Pre	Post	Diff.	Significance
Enlist Supervisor in Development	2.71	3.90	1.19	.001
Try Spare-Time Activities	3.22	4.18	.95	.001
Try to Enrich Present Job	3.26	3.95	.69	.005
Seek New Job Internally	3.40	4.04	.63	.01
Seek New Job Elsewhere	2.86	3.25	.59	.02

Figure 3
Predictors of Self-Development Activity

	Mult.-R	R^2	R^2 Ch.	R	Beta	B
Psychological Growth Needs	.44	.19	.19	-.44	-.80	-.47
Level of Education	.59	.35	.15	.28	.50	.96
Instrumental Needs	.72	.51	.16	.03	.48	.31

Constant 14.69

To test the remaining hypotheses, each individual's current and planned actions were summed to compute a total "self-development activity" score. These scores ranged from four to fourteen specific activities. Then, each individual's demographic data and questionnaire scores were regressed upon the total activity score to identify "predictors" of self-development effort. The regression analysis was conducted using the SPSS REGRESSION program.

DISCUSSION

As hypothesized, the participants reported increased self-development activity at the end of the program. Figure 3 shows the only three variables which predict the amount of that activity. Contrary to hypothesis, the most active participants are not those having frustrated needs for psychological growth. Rather, they are those having strong "instrumental" needs, that is, desiring "high salary and fringe benefits," "rapid promotions," and "good job security." As shown, the more active also are the more highly educated in the group.

Additional analyses disclosed that the more active individuals occupy significantly higher salary levels than those less motivated toward career development. Furthermore, the active persons tend to pursue development strategies aimed primarily at finding higher-paying jobs either within or outside the university.

The data suggest that the primary impact of the program was to help "plateaued", career-oriented professionals to search more artfully and actively for new jobs. This finding is consonant with the industrial literature on development strategies of mid-career managers (e.g., Bray and Howard, 1980). That research shows that status striving remains the primary focus of development longer into a person's career the more "successful" that career. Managers tend to perseverate in pursuit of upward mobility until lack of "success" manifests itself undeniably. Only then do pyramid climbers adapt to blocked mobility by seeking non-hierarchical paths to personal growth.

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FACULTY VITALITY UNDER CHANGING CONDITIONS

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BACKGROUND

Concerns about the continued vitality of faculties and institutions which preoccupy many of us in higher education today should be considered in the context of widespread societal concerns for the vitality and health of America's economy and way of life. Politicians urge us to revitalize or reindustrialize our technological base while analysts ponder the balancing of choices: quality of life vs. economic development (White, 1982). If then under these conditions there is concern in the larger society with vitality, it follows that concerns would be intensified for the status and condition of higher education which is primarily responsible for enhancing and disseminating the knowledge base critical to societal productivity and quality. It is to issues of faculty vitality that this inquiry is addressed.

In the 1970's the prospect of a "steady-state" and even decline became the reality for higher education as enrollments leveled off or shrank. Enrollment projections and associated faculty position forecasts share a common pessimistic outlook which predicts declining faculty demand in the eighties and for most of the nineties. Couple the present and predicted relative lack of faculty openings for more recently trained and usually younger doctorates with immobile, aging and increasingly tenured faculties and the concern with faculty vitality becomes one of the most significant issues in American higher education of our times (Carnegie Council on Policy Studies in Higher Education, National Science Foundation Advisory Council, 1978; National Research Council, 1979).

The roughly 3,000 institutions of higher education in the United States are extraordinarily diverse in the functions which they perform for our society. In a large-scale national study sponsored by the Carnegie Commission, Fulton and Trow (1974) have spelled out the division of labor within American education relative to teaching and research activities. They have suggested that in the "leading" universities, the faculty role includes the expectation of continuing research activity. In some other universities and colleges the primary faculty role emphasis is upon teaching. Thus, consideration of faculty vitality cannot and should not be separated from the mission(s) of the institution. It suggests that institutions with different functions or emphases will have different ideas about faculty vitality and, to carry it a step further, different ideal types of faculty role performance will emerge.

The implications for faculty vitality drawn from the typology which fits research-oriented Universities such as the University of Minnesota generally are that the several missions of the institution will be reflected in the assignments, expectations, performance and vitality of the faculty. Thus it was not surprising that University's Planning Council included the following definition of faculty vitality in a memorandum to President Magrath:

> ...A faculty is vital if it exhibits sustained productivity in its teaching, its research, and its service activities. Productivity is characterized not by quantity of output but by quality of these outputs as judged by faculty peers. A faculty is vital if it is continually creating important, new knowledge and expanging out understanding of the world in which we live. A faculty is vital if there is a balance between innovative and traditional approaches to teaching and research. The University faculty is vital if it is responding to the needs of the state, the nation, and the world for new knowledge. On occasions, this vitality is recognized through awards and prizes for scholarship. Perhaps most important a faculty is vital if its members find their work stimulating, enjoyable and satisfying. (Planning Council, 1980, p. 4)

It is from the core of this definition of vitality, "sustained productivity in its teaching, its research, and its service activities," that we developed an operational assumption for an exploratory study of faculty careers.

PLAN OF STUDY AND PRELIMINARY FINDINGS

Study Phase I - the Highly Active Ideal Type[1]

The focus of the inquiry is the convergence of the organizational and individual in careers, the structural determinants of behavior in organizations, and the interactive aspects of the person-organizational relationships.

Using a reputational two-step nominations process, samples of faculty members who met criteria for inclusion into the highly active ideal type who continuously publish, teach and perform administrative and/or professional services at highly productive levels, were identified by broadly knowledgeable faculty and administrative colleagues.[2] Samples were drawn from four areas: biological sciences, the physical sciences and mathematics, and the social sciences and humanities. At least two judges recommended each tenured associate or full professor nominated for inclusion.

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[1] In order to extend the exploratory inquiry of models of faculty vitality and as a basis for development of comparative data, a representative faculty sample was drawn from the same University colleges during 1981-82. Applying stratified random sampling procedures to specially drawn personnel data system listings, requisite proportions of tenured senior faculty were obtained and interviews were completed with eighty-four persons.

The parallel interview study with the representative group was accomplished to provide essential baseline data. For larger scale studies beyond the University of Minnesota, such as models and problems of faculty vitality in our institutional reference group, the Committee on Institutional Cooperation institutions, or differential models of faculty vitality in other kinds of institutions (state college systems, or small private liberal arts colleges for example), or specialized studies such as career vitality issues of women and minorities, or generational cohort differences in career vitality, benchmark institutional case studies are the essential first step.

[2] In the editor's introduction to a special issue of *Sociology of Education*, Donald Light observes that Fulton and Trow in their paper "Research Activity in Higher Education" (in the same issue) have located "one breed of faculty who does everything--publish, teach and administrate. As the authors say, this researcher is clearly not isolated in his laboratory or study. Instead he is a triple threat: you can't keep a good man down." (Light, 1974, p. 23)

Approaches to Analysis

Because it was considered premature to approach this research problem through traditional theory testing and verification procedures, the research strategy and methodology were based primarily upon a qualitative paradigm which emphasizes discovery or generation of theories. However, we assumed that quantitative methods could be used also, to enable us to triangulate on the underlying facts and offer some perspective on the relative frequency with which certain events and assessments were reported.

Preliminary Report of Phase I Findings: Characteristics, Assessments, Preferences

Eleven percent of the total sample of sixty-three interviewees were women, and they were distributed across the four areas. The ages of respondents ranged from the early thirties into the sixties, with a median age in the forties in all four fields; most were born between 1925 and 1945. The social science group had somewhat fewer younger people than the other groups. Of the total group, doctoral years spanned three decades with most of the concentration in the 1950s, 1960s and, to a lesser extent, the 1970s.

These faculty members were asked for their own comparative view of their success at various career stages. As if to acknowledge or reaffirm the estimation made by others, some 70 percent of the total sample responded that they have been either "more successful" or "much more successful" than their peers. Most of the others regarded themselves to be at least as successful as their peers.

They also typically think that they work harder than most of their colleagues; 68 percent hold this view. Among those 30 percent who, perhaps with some modesty, stated that they were average in this respect, a number went on to say that they thought their colleagues were, in general, a hard-working group.

Trow (1974, pp. 32-33) found that of the total national sample of faculty members surveyed by the Carnegie Commission in 1969, 77 percent indicated their interests lay either "very heavily in teaching" or "both but leaning to teaching." However, in that subgroup of faculty drawn from high quality universities into the Carnegie Commission survey, the responses divided quite evenly between preferences for research and for teaching (Trow, 1975, p. 44). In our study we found that the preference for research is a decided one, particularly among the biological and physical scientists. Of the total group, 51 percent selected "both, but leaning to research" and 29 percent selected "very heavily in research/scholarly work."

By self-report, the overwhelming proportion of these faculty members consider themselves to be among the "moving" rather than the "stuck," to borrow Kanter's terms (1977). When asked "Do you have professional or career ambitions that you hope to achieve in the next five to ten years?", over 80 percent of the group were able to indicate specifically what they hoped to do. When asked "Have you ever felt that you reached a certain level and became blocked or stuck in your career, that you lacked opportunity or were unably to take advantage of opportunity to move ahead?" (and related probes), 90 percent responded to the effect that they had not had that experience.

In similar vein, 82 percent of the highly active group report perceiving no decline in their performance productivity over different career stages. However, some differences by field are suggested in the responses with 38 percent of the physical scientists and mathematicians claiming that their performance has decreased.

While productivity seems to be holding its own, some changes in energy level were noted. About half of the total group report a decrease in energy level over that attributed to earlier career stages, and the other half report no change or an increase. Respondents did express some age-associated explanations with their personal assessment, coupled sometimes with the comment that they had learned how the system works and how to use work time and energies better than in earlier years, thus becoming more efficient.

This group responded in the affirmative to the question "If you were starting over today, would you choose again the career of faculty member?" In spite of the well-publicized decline in the conditions of academe and the problems of faculty relative to the tight market, declines in real faculty income, changes in public confidence in higher edication and others, 42 percent of the total group indicated that they would choose this career again now without hesitation, and another 49 percent indicated that they would follow suit, with qualifications.

Motivational Characteristics of a Productive Faculty Group

Studies of faculty have frequently emphasized the importance of motivational factors intrinsic to a faculty member's work in contrast to extrinsic rewards. Citing the studies by Ruth Eckert and John Stecklein (1961) and several others, Wilbert J. McKeachie describes conditions that lend themselves to motivating faculty:

> ...[P]eer support, a feeling of autonomy and control over one's work, a sense of stimulation from one's students and colleagues, and an administration that encourages rather than restricts faculty initiative -- all of these contribute to higher levels of motivation and investment on the part of faculty members. (1982, p. 462)

The responses to two questions in our study with respect to satisfactions and dissatisfactions of career followed a similar pattern with frequent mention of intrinsic aspects of academic work, such as the intellectual play of ideas, the attractions of research and teaching and of the academic life style, notably, its freedom as satisfactions. Similarly, dissatisfactions focused on salary and administrative attitudes. In addition, there were concerns regarding funding possibilities and institutional support of the academic life generally.

A mixture of internal and external explanations was given in response to the question, "How do you judge how well you are doing?" There was strong evidence of reliance on external recognitions whether formal or informal by many, but there was also a sizable group in most fields for whom their own self-assessments were most important.

Environmental Factors Contributing to Faculty Vitality in a Selected Group

The supportive aspects of the environment, which included stimulating colleagues, strong academically-oriented administration, and recognition by administrators and colleagues, were reported as positive factors in their productivity by 51 percent of the respondents, and research funding availability was discussed by 46 percent of the total group.

Faculty development resources such as single quarter leave and sabbaticals were seen as positive elements by some, but others were concerned about lack of free time that can be distinctly dedicated to research. Similarly, quality of graduate students is mentioned both positively and negatively.

Specific support for faculty research is the area in which faculty feel very strongly with respect to the freedom aspect. The ability to direct one's own scholarly activity is one of the most frequently mentioned attractions of an academic career. Also stressed is the availability of time for research because one is not burdened by heavy teaching or administrative responsibilities. However, others find problems in both the lack of funding and burdensome teaching responsibilities, and also with the quality of library and laboratory facilities.

INSTITUTIONAL POLICY AREAS: IMPLICATIONS FOR FACULTY VITALITY.

This study has been premised on the idea that individual and organizational vitality are interrelated. Preliminary findings from the sample of highly active faculty members at Minnesota suggest that these persons, who may serve as models of vitality for others make assessments of themselves, their colleagues and students, and their environment from which institutional policy implications, such as the following, may be framed.

1. *Provide an environment supportive of the scholarly interests of the faculty.* Recurring themes include first the importance of administrative attitudes and behavior as reflective of scholarly concerns, second, the need to recognize the full range of faculty accomplishments in reward and recognition systems, and third, the need to encourage development of an intellectually stimulating community of colleagues through careful recruitment of faculty members and graduate students, and sponsorship of opportunities such as exchanges.

2. *Support faculty research activities.* Research-oriented faculty embody the dominant norms in certain types of institutions; thus it is not surprising to find a theme emphasizing freedom of intellectual inquiry and the individual work schedule autonomy which supports it. A second theme focuses on adequate time for research, and the atmosphere of expectation that encourages productivity. Third, continuous need exists for provision of "seed" money to initiate research and carry people through noncontinuous funding. Fourth, since highly active faculty consider that research and graduate training form an integrated core, concerns about student quality and support are well within the policy domain. Finally, the adequacy of library and laboratory facilities, including the maintenance and "revitalization" of aging facilities, must also be planned.

3. *Provide differentiated support for individual faculty needs.* Concerns emerge of a somewhat specific nature which highly vital faculty members have for their colleagues rather more than for themselves. First, for faculty members who research interests have run dry, or are not attractive to funding agencies, collegial guidance, support and seed money is important if they are to take risks and move off in new directions. Second, for faculty members who become "stuck"

in their careers due to assignment and reward structure discontinuities, special support, leaves or outplacement may be considered. Third, since the youngest cohort of untenured faculty is facing rigorous standards of review, sponsorship/mentorship of their neophyte years is important to assure the productive faculty futures so essential to the condition of higher education in the decades ahead.

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PROFESSIONAL DEVELOPMENT : FROM INSIGHT TO ACTION

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This paper examines, through a case study, the relevance and the applicability of the theory-of-action perspective developed by Argyris and Schon (1974 and 1978) to improving university teaching. Recently Heller (1982) has outlined how this approach might be used to help both academic and administrative staff in higher education solve the variety of increasingly difficult and urgent problems with which they are faced. However, the emphasis in Heller's writing is on managerial and administrative problems whereas our concern is specifically with improving teaching. We have used the theory-of-action perspective to help us understand what happened in a particular teaching situation and thereby to assess both the potential and the limitations of the approach and what needs to be done to apply it effectively. This work is at an early and a tentative stage but has nevertheless revealed some interesting insights which will inform our future research in this area. Heller is critical of the 'service model' on which many current professional development efforts are based (i.e. a gradual approach which concentrates on low risk projects and peripheral services which do not threaten staff). He points out that such an approach may have unintended consequences, may reinforce existing problems and may approach problems with the same strategies as gave rise to them in the first place. This approach, which avoids the reflexive examination of both the underlying governing values which determine actions and also the implications of the particular courses of action results in what Argyris and Schon call 'single loop learning'. The consequences of single-loop learning are the escalation of existing problems and the creation of new problems. A central concern of the theory-of-action perspective is that most current institutional problem solving is single-loop.

In order to identify and clarify the errors which inhibit effective problem solving Argyris and Schon (1974) suggest action needs to be based on 'double-loop learning' in which the tacit values and assumptions which are embedded in action are made explicit and their implications examined. Where unintended consequences are evident it is necessary to expose and change the normally tacitly held principles which determine the person's theory-of-action. Heller's contention is that while many current approaches to professional development may be good at making these tacit values and assumptions explicit there is still a gap between such insight and effective action. The theory-of-action perspective is designed particularly to bridge this gap between insight and action.

The theory-of-action perspective identifies the values and assumptions held by individuals which in turn underly and determine their actions. These principles are internalized and known tacitly (Polanyi, 1967); that is, they are not referred to consciously when individuals take action. Rather these 'theories-in-use' have been so well learned that action flows smoothly from them without interruption for conscious deliberation. As a result recognition of the errors which produce ineffective action is very difficult. In addition, when asked to give reasons for an action an individual will rarely have access to this tacitly held knowledge but will instead give reasons, principles, assumptions and values they feel are appropriate to the context - what Argyris and Schon term an 'espoused theory'. There are often striking differences between this espoused theory and the implicit values and assumptions which can be inferred from analysing what the person actually does -

his or her theory-in-use. The identification and exploration of such differences can provide a powerful impetus to change.

Model 1 and Model 2 Theories-in-Use

Argyris and Schon (1974) argue, with illustrations, that a theory-in-use based on single-loop problem solving producing undetected and escalating errors is very common. They term this 'Model 1 Theory-in-Use'. As we have previously explained, when individuals take action they do so in accordance with a set of internally acceptable standards or 'governing values'. When events are at odds with these standards the person acts to reduce the mismatch-using what he considers to be appropriate behavioural strategies. Four governing values seem to predominate in the Model 1 Theory-in-Use: define one's goals in private and be reluctant to change these goals so as to make them more congruent with those of others; maximise winning and minimise losing actions in order to achieve personal goals; minimise generating and expressing feelings; value rationality. To satisfy these values four corresponding strategies for action can be identified:design and manage the environment unilaterally; own and control the task; protect yourself and limit personal vulnerability; protect others from being hurt.

Such values and strategies have a certain functional utility until fundamental changes need to be made, then they tend to conceal and perpetuate errors and create new problems.

Argyris and Schon suggest an alternative which they term a 'Model 2 Theory-in-Use ' (but not the direct opposite of the previous model). Rather, this theory-in-use values: the production of valid information; free and informed choice in decision making; commitment to decisions made and the evaluation of their effects. The associated strategies are: strong advocacy of personal positions together with an invitation to others to inquire into or confront one's views; joint ownership and control of the task, joint protection of self and others orientated towards growth. Argyris and Schon claim that the values and strategies consistent with this Model 2 will enable staff to identify and solve problems effectively.

Analysis of Classroom Dialogue

Our interest in the Theory-of-Action perspective lies in its application to understanding the significance and meaning of interactions between teachers and students. We wanted therefore to analyse a particular teaching episode to see to what extent a teacher's actions would fit into a Model 1 or Model 2 framework and to compare that mode of analysis with the more usual but less structured one of picking out from a teaching episode what seem to be significant events. In connection with a course evaluation scheme at Birmingham University (Mathias and Rutherford, 1982) we offer a facility for video recording lectures and seminars. It is one of these recorded seminars which we chose to analyse.

Argyris (1980) proposed six levels of analysis. Heller identified three levels which are broadly similar to the first three suggested by Argyris (1980). These are: firstly, the observable data - the face value of the actions individuals take or the words they say; secondly, the socially significant meanings that the students infer from such data; thirdly, the inferred behavioural strategies underlying the significant meanings. We have added a fourth level in which the categories which emerge during the level 3 analysis are related to the characteristic strategies associated with Model 1, Model 1a (the direct opposite of Model 1) or Model 2 theories-in-use. Table 1 is a transcribed part of the first ten minutes of the recording during which the teacher finalised arrangements for future seminars - with our analysis at level 2, level 3 and level 4. There were no contributions from the students during this period except for the occasional grunt (of acknowledgement or agreement?).

Discussion

Looking down the level 3 column there is a large proportion of the teacher's actions which have been classified as controlling others and defining the task for this seminar but also for a range of students' study behaviours in relation to seminars in the future. There is little evidence of students negotiating a choice of topic they would like to explore in a future seminar. Another predominant strategy is advocacy without enquiry - that is, suggesting a course of action without seeking any reaction as to its acceptability from the students. This is another aspect of defining the task without consultation. There are also a few examples of unillustrated evaluation - that is, making a value judgement without revealing the basis on which it was made nor opening it up to challenge and disconfirmation. For example, Statement 21: "Cole has got chapters you should be familiar with now". The teacher makes an evaluation of what he considers the students should know but does not give any examples or say how or why these chapters fit with the theme currently under discussion. This leaves the students in no position to assess the value of his assertion because they have no further information on the basis of which either to accept or reject it. All that remains is the authority of the teacher as an influence in their reactions. They can react to what was said not by considering the evidence but only on the basis of who said it. The teacher's hidden agenda is 'You had better believe it because I say so'. These strategies of controlling others and defining the task, advocacy without enquiry, and unillustrated evaluation are all characteristic of Model 1 Theory-in-Use.

There are only very few places in this section of the recording where we might be able to infer Model 2 strategies. Statements 13 and 15 are possible examples. Here the teacher suggests that two students should do a particular task then asks them which each would like to do. To what extent this was seen as a genuine choice - an area for negotiation by the students - we do no know, except that one makes a very half-hearted reply in choosing the 'bottom line.'

So this seminar seems to start and continue for the first ten minutes of task setting with the teacher displaying predominantly Model 1 behaviour. The levels-of-meaning analysis points to a theory-in-use which involves teacher ownership of the task based on private goal definition coupled with controlling and manipulating the students to achieve those goals. Comments made by the teacher immediately after the seminar revealed a rather different espoused theory. He said he wanted to stimulate discussion and not alienate anyone, he saw his role as offering guidance and necessary information. He felt he had been reasonably successful in doing this. In the event the seminar comprised a ten minute talk by the teacher setting up tasks for the future, a twenty five minute reading of a seminar paper by a student, two or three questions from other students and a further twenty five minute mini-lecture from the teacher interspersed with minor contributions from some of the students.

Corroborative Evidence

If we look in a little more detail at aspects of this seminar and at points made by both teacher and observer while viewing the video tape we find further evidence of what may seem a rather bleak diagnosis - a Model 1 Theory-in-Use.

TABLE 1

Statement Number	Level 1 Dialogue	Level 2 Significant Meaning	Level 3 Behavioural Strategies	Level 4 Theory-in-Use
1	Now then what we are doing today then is learning theory	I decided that today we would do learning theory	Define task (or unilateral action)	1
2	Ian is doing the second line (reading from seminar paper list)	I gave Ian specific work to do	Define and control task	1
3	John's doing the third line	I gave John specific work to do	Define and control task	1
4	He is not with us yet I see	He should be here to do it	Evaluation/ untested	1a
5	I've got Pam and Bill down to do next week on cognitive styles	I gave Pam and Bill cognitive styles to do for next week	Control others/ define task	1
6	First week of next term, learning strategies. Now Mark you get stuck with one of these?	I think Mark should do learning strategies	Advocacy/no enquiry	1
7	mm (student)			
8	Alan, you'd better do one of the others as well	I think Alan should do one of the others as well	Advocacy/no enquiry	1
9	mm (student)			
10	Start knocking up your quota	Alan has not done enough yet	Evaluation/untested	1
11	Learning strategies I already talked about the top line - I can do that again	Listen to me	Control others/ define task	1
12	You two guys do the second and third lines	That leaves you to do lines 2 and 3	Define and control task	1
13	So who'd like to do what?	Who is going to do which one?	Negotiation	2
14	mumbles (student)			
15	You're going to do the bottom line? Right?	You are saying you will do the bottom line	Enquiry	2

16	Right, reading on that, I've starred two things on the list. Book X, both of you will find that useful	I know that is worth reading on this topic. You will find it useful	Unillustrated evaluation	1
17	The other thing I've starred is an article. That's general reading for everybody	Everyone in the class should read this	Advocacy/no enquiry	1
18	Its good enough but in fact a longer article dealing with	I think this article is not as important as the other one	Unillustrated evaluation	1
19	Topic A in Journal Y by the same author is better	You should read it	Advocacy/No enquiry	1
20	You will find that even better on Deep Processing	I think this article is even better on Deep Processing	Unillustrated evaluation	1
21	Cole has got chapters you should be familiar with now	I think they ought to know Cole by now	Advocacy/no enquiry	1
22	Mark you try and tell us about Surface Processing	Mark should do this	Advocacy/no enquiry	1
23	Alan you'll explain to us how questions affect the levels of processing	Alan should do this	Advocacy/no enquiry	1
24	I'm not going to give a lecture next week by the way	I don't think I should lecture next week	Unilateral decision	1

Despite the teacher's intentions the students did not become involved in any significant way in discussion during the seminar (in fact, three of the seven students did not contribute at all to the discussion). The paper presented by the student did not raise issues for discussion - it was closed in much the same way as unillustrated evaluations are closed - they are undiscussable. While the paper was being read the other students made notes, some continuing to do so rather than join in the subsequent 'discussion'. A clue as to why may be found in the teacher's comment: "You will only be examined on topics we have covered in the seminars". The question of coverage also emerged as a dilemma for the teacher: "How can I encourage discussion yet also ensure the important points are raised?" He also worried about 'filling the time' which led him to overtalking.

The students completed a short questionnaire surveying their reactions to the seminar. In general the students indicated they were happy with the format of the seminar, the way the work was allocated and the balance of 'discussion' to 'lecture'. Yet those who acknowledged rarely contributing to seminars claimed to be afraid to do so in case they said something stupid.

These questionnaire results are open to a number of interpretations: we could argue that they tend to contradict the theory-of-action analysis because they demonstrate that students do not seem to feel that the task is being defined for them nor that they are being manipulated. On the other hand it could also be argued that the teaching system as a whole (the teaching style, the learning behaviour of the students, the assessment based on seminar topics, the way work is allocated and the way the subject is presented) is manipulative - that is the students' rather passive response is consistent with an interrelated system which alienates them without their awareness andwith their tacit acceptance (See Radley (1980) for a striking analysis of this type of teaching system). To us the weight of evidence seems to support the latter conclusion. A gross analysis of the seminar from the video tape seems to point to a 'transmission orientation' (Eraut 1975) conception of teaching on the part of the teacher and a corresponding conception of learning on the part of the students. This is quite consistent with Model 1 teacher's strategies. Indeed there seems to be no contradiction between the two modes of analysis; rather they seem to be complementary.

This case study is our first, tentative attempt at using the theory-of-action perspective in the context of our existing professional development activities at the University of Birmingham. Arising from this are many questions we need to examine in more depth. In particular how can we enable teachers to move through the levels-of-meaning analysis, themselves recognise differences between their espoused theory and their theory-in-use and progress from these insights towards effective actions.

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THE ACADEMIC FORUM: A HIGHER EDUCATION QUALITY CIRCLE

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Throughout industry Quality Circles are used to improve productivity. Rosen (1981) defines Quality Circles as, "small groups of employees meeting regularly to spot and solve problems in their areas of work" (p. 25). The first Quality Circle in the United States was at Lockheed Missile and Space Company and now such groups are operating in about 250 companies. Quality Circles originated in Japan after World War II when, "MADE IN JAPAN, symbolized poor shoddy quality to the rest of the world.... Emulating America's Zero Defects (ZD) movement, workers were organized into small groups in an effort to control quality more closely." (Dreyfack, 1982, p. 131) After forty years, Quality Circles are still effective, but now "what the Japanese are striving for is not quality control, but to go beyond mere control to continuous quality improvement" (Moritani, 1982, p.54).

In the fall of 1980, some of the faculty members at Felician College, a small liberal arts college for women, believed something was needed to address their intellectual, professional and personal needs. Thus, the Quality Circle model was established to serve the development of the teacher, the human being who was doing the teacher. The group adopted the following general goals for Quality Circles as stated by J.M. Juran.

1. Improvement of performance through group activities
2. Personal development and a desire for learning
3. Recognition of their efforts within the organization, and the chance to participate in symposia and foreign study tours
4. Pursuit of creativity within an otherwise monotonous work routine (Moritani, 1982, p.93)

The following dialogue is an example of how the group aids the individual in the understanding of the self within the bureaucracy:

Seated if front of the fire at Nancy's house on a snowy Friday night, Marytha asks the group to look at the chart she had distributed.

"Can you see the changes in the artist's work? she asks.

"Geri replies, "I can't see anything because you hve reduced the print too much".

It"s too crowded and aesthetically unappealing," Cecelia remarks straightforwardly.

"Can't you make this into two charts?" Dolores asks.

"No, it wouldn"t make sense that way," Sr. Firmina, our mathematician answers.

"Where is the title?" interjects Charlie, an English Professor. "Every table must have a title."

Carol comments, "I did some work using an Osgood Differential Scale a few years ago. I'll put the information in your mailbox on Monday, Marytha."

The group moves on.

Cecelia says, "I'm having difficulty getting the curriculum committee to accept that new course in reading".

"Have you given them a written proposal which shows your expertise in this area?" suggests Sr. Firmina.

"That's a good idea , I didn't want to appear to be bragging to them." Cecelia modestly admits.

Nancy asks the group, "Could you give me some thoughts how to begin the article I am writing about our Quality Circle?"

"Why don't you start with some dialogue which illustrates actually what takes place?" Sr. Olivia, our journalist proposes.

The membership consists of any individual within the Felician faculty and friends of members who are in the academic community. It is an inter-disciplinary group with representatives from art to mathematics, from nursing to teacher education. The initial impulse was to open the membership only once a term was abandoned in favor of keeping the group open throughout the academic year to interested faculty who intend to attend regularly.

Meetings are held once a month at the members' homes on a rotating basis. The comfort and hospitality of the various homes adds greatly to the success of the Forum. Refreshments are served and have ranged from gourmet suppers to simple pretzels and potato chips. The only cost of membership is the grocery bill one assume's at one's turn and the gasoline used to drive to the members' houses which range within an hour's drive.

The group, intending that it would become a meeting ground for the exchange of academic thoughts, was named The Academic Forum. The specific purpose of the Forum is to give support to one another in order to encourage on-going scholarship, to form creative ideas, and to share information, talents and resources. The Forum's role is to act as a sounding board, an oasis of Affirmation, the Devil's Advocate, an anchor of hope for wild ideas, and a shepherd, or "tough love" pusher at other times.

A careful discussion of the needs of each of the group members helped the Academic Forum arrive at a general format which is very flexible. To call the evening's format an agenda is to use that word loosely. At each meeting, there is a warm-up, an opportunity to get-into-the-mood period. Then, if a person has distributed material to be examined, this is done verbally and each person's copy is returned to the author with written comments. If the person has not distributed any materials before the meeting, the work is read orally and discussed during the evening. Also, if a member has a problem to present, for example, "How can I get publicity for my book?" the group addresses itself to this problems. Progress reports of the members' accomplishments are usually part of the conversation. Finally, the meeting ends informally over refreshments and coffee.

A loose format gives the Academic Forum two distinct advantages. The first is that the pressure of time "to cover" the materials is erased. This makes for a more leisurely and thoughtful conversation. A time rhythm of the group of the group has begun to ease into a pattern of sorts anyway, resulting in productivity with relaxation. The second, is that the work in progress brings freshness and immediacy to the evening's agenda. Enough work has been in progress to keep the evenings full; there has even been a backlog! The nature of the meeting engenders ideas; the enthusiasms and encouragement of the group furnishes much of the impetus to make the ideas become working plans. Specifically, some of the members' concerns were to finish a dissertation, prepare a paper to present at a national convention, write an article for a professional journal, prepare long-range plans for the college, establish a network for professional women and prepare a grant proposal.

From time to time, direction is called for and this has evolved into the responsibility of one or the other of the founding members. Even a flexible meeting format requires its own internal framework. Half-way through the academic year, it became apparent that the dialectic between freedom and limits needed to be articulated. Ground rules germane to our particular circumstances are as follows:

1. All of the members must be given an opportunity to present their needs. This means affording enough attention to the presenter of a work so that the presenter feels satisfied that the problem is clarified, the work fully critiqued or the plan carefully discussed. This also means keeping to the subject.

2. Confidentially must be respected. Keeping the conversation within four walls of the room is an effective policy. We may speak freely, but responsibly.

3. Criticism must be given in a professional manner and only the product may be criticized, not the person who produced it. The members are asked to assess and evaluate, but never judge; to be careful of words; to eliminate such words as "bad", "illiterate," or other phrases which contain sarcasm or innuends. The individual who has brought work to be criticized must be able to take suggestions graciously. Defense of one's work is not the purpose of the discussion.

4. All of the members are expected to share their talents and resources to help the person presentig his/her work. The presenter of the work indicates what direction to take, that is, how to read the material and makes clear the intention of the work. The reader's responsibility is to evaluate, to suggest, to clarify, and to recommend.

5. Once a person joins the group for the academic year, the group expects that he/she continues to attend meetings on a regular basis and enters into the mutual responsibility of giving and taking.

6. If a member gives an idea away to someone else to develop, the first member must realize that the idea has been relinquished, and thus must accept the outcome.

Since its founding at the beginning of the 1980-1981 academic year, The Academic Forum has accomplished the following:

1. Made suggestions for a more effective paper to be presented at a national professional conference.
2. Recast a speech into a format suitable for publication in a professional journal.
3. Edited a paper to prepare it for publication in a journal
4. Surveyed appropriate journals to publish a hard to place article.
5. Discussed two dissertations to help clarify certain concepts and to suggest improvements in writing style.
6. Assessed the conclusions of another dissertation to make it comprehensible to faculty outside the discipline.
7. Examined the scope and ramifications of such topics as long-range planning, grant-writing ethics, modes of thinking, educational competencies, types of research, workshop procedures and inter-disciplinary strategies.
8. Established a network to aid each other in times of stress. Recommended and lent source material which supported members' special projects.

Besides the above, many other intangible and tangible benefits come from this model of faculty development. Foremost, the Forum has become a close knit support group which keeps in contact between meetings. Overall, members listen to each others problems, suggest solutions that have worked for them and encouraged completion of projects reviewed at previous meetings.

The morale of the individual members improves because they now have a group to rely on when experiencing difficulties. For example, a new faculty member was having a problem in her classes, and through suggestions given by more experienced teachers, she was able to have a more successful relationship with this class. Also, many day-to day interpersonal problems were made lighter by being able to talk it out with a member of the group who had the necessary expertise and who could be trusted. The unity of support and joy in each other's achievements which resulted from this type of faculty development produced more accomplishments for participating faculty members than any other type of development programs in which we have been involved previously.

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COLLEGE MENTAL HEALTH SERVICES: A WORKING MODEL

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The Indian Institute of Technology Madras is one of the most advanced centers of learning in India. Based on the models of existing college mental health services in the west an eclectic model for providing mental health services was proposed to the concerned authorities of the Institute. The model was accepted and the services came into operation a couple of years ago. The author is a staff psychologist with a training in counseling psychology and functions as one of the working members of the Health Services.

The IIT like similar learning institutions with its vast input of brilliant students has characteristic problems like a fierce competitive milieu, achievement anxieties and consequent development of inadequate learning and stress coping patterns. The segregation of the compus from the city has also generated problems like homesickness, lack of supportive figures to relate to, and development of escapist behavior like drug and alcohol abuse. These problems are in many ways compounded by the common transitory adolescent problems.

College mental health services have been increasing in number, size and usefulness to their eligible students in the western countries and there has been an awakening of interest in such services in India lately. In the last few years there have been impressive developments in structuring such services within the Indian Institutes imparting higher education. As college mental health services have increased in number, influence and effectiveness, they have tended to move slightly away from older concepts of mental hygiene and have tried to incorporate emotional and academic vulnerabilities of today's college populations. Only since World War II has there been an awakening in the area of including mental health services with the broad educational programmes servicing the student communities. From 1946 to the present there has been impressive progress in the area of developing psychiatric and counseling services for students. One of the earliest records of a college mental health service is that of a clinic established by Stewart Patron at Princeton University in 1910. (Fansworth, 1957) At this point it is advisable to remember Fry's (1942) statement which still continues as a guidelines for college psychiatry... 'the objectives of college mental hygiene is to increase individual security and independence by aiding in the achievement of mature self management'.

Structure and Administration of College Mental Health Services:

In the development of a formal mental health service of this nature the primary emphasis is placed on the role of psychiatrists, psychologists and social workers. The varied personnel, rendering psychological and supportive assistance to the college population, should be linked together into a network where they should work cooperatively and keep all lines of communication open. The justifying reason for such a network functioning, is to identify all kinds of problems that the students face; appraise and isolate all variables in the environment that generate such problems; and develop crisis intervention programmes for each individual problem.

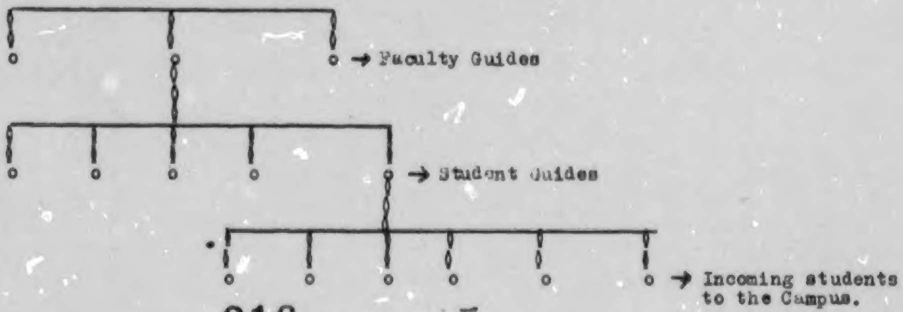
Hence, college mental health services follow many models, but most services do not include all varieties of crisis intervention measures within a single division or department. A common model, one that borrows heavily from the western models, is that of having psychiatrists, psychologists and social workers within the medical section of a college health service, working in close collaboration with a separate student counseling service, headed usually by a psychologist. Such an arrangement is often ideal, as emergency problems like psychotic breakdowns, suicidal attempts, neurotic anxieties are handled by the medical health service, and problems stemming from learning inadequacies, career counseling needs, financial problems and the like are handled by the counseling service.

A Working Model of the Present Service:

The mental health services of the I.I.T. Madras has come into operation recently. It has developed into a

FIGURE-1

A Schematic Representation of the Counseling Unit



productive unit due to the energies and efforts expanded by the working members of the unit. The unit in Madras has borrowed some of the working patterns from a few such units in existence within other campus of India. One of the reasons why the unit developed as a formal network was in response to same campus suicides, academic anxieties and certain psychiatric emergencies among the students.

The present mental health service in IIT Madras operates in two sections. One section is involved in the diagnosis and treatment of minor and major psychiatric illnesses. Crisis intervention in these cases is difficult and requires skillful evaluation, as often the distinction between an actual crisis and a developmental problem that is resolved eventually, is not an easy task. This section is managed by a psychiatrist and a psychologist and the treatment mode ranges from brief, intense psychotherapy (as long-term psychotherapy is rarely undertaken in a college mental health service) to voluntary hospitalization for major psychiatric breakdown. The unit sometimes functions purely as a supportive facet in answering common medical queries regarding general health, skin, and sexual symptoms.

The second section is the counseling section. This unit has a characteristic three tier structure. The first tier consists of few faculty members who are operative as administrative heads and are usually called upon during policy changes and implementations. The second tier consists of a number of competent and approachable faculty members referred to as 'the faculty guides'. Each guide has under him/her six or seven 'student guides' who form the last tier of the unit. Each student guide counsels six of the incoming students to the campus. The students guides are selected from a population of engineering students with the help of in depth interviews and faculty references.

The faculty and student 'guides' are exposed to intensive workshops in 'Psychological Crisis Interventions' and 'Supportive Behavior Patterns'. Principles of confidentiality and the early detection of symptoms are impressed upon the guides. The student guides meet their counselees regularly. The role of the student guides is manifold. It ranges from providing factual information regarding texts, teachers and compus living to channelising the energies of their counselee to the varied campus sports and extracurricular amenities.

In cases where the student guides recognise symptoms of severe underachievement, drug abuse, depression or suicidal tendencies, they refer the matter to the second tier faculty guides who may call in the services of the medical health services.

The entire counseling service forms a cohesive unit where each incoming student is guided so that there is early detection of mental illness. The guides' often undertake researches into varied aspects of campus life like general health, messing and academic facilities that impair student morale, performance, safety or health.

Certain Identified Adjustment Reactions:

A number of symptoms of emotional setbacks occur in young adults who are under stress, last for sometime and are usually followed by a healthy adjustment. Symptoms like anxiety, depression, hypomanic behavior, drug abuse, temporary breaks with reality and the well recognized identity crisis represent the common adolescent problems (Blaine, 1971).

Depression, even within the present campus, has been identified as the most common yet complex of the conditions that lead college students to seek help. Most students here report temporary apathy when the areas of work and his expectations became too great. Competition among the students for grades and further admissions is increasing and having its toll. When conflicts result in a sense of emptiness, with loss of feeling for all people and the self, depression is severe and the possibility of suicide considerable.

Suicide is second only to accidents as a cause of death among college students. There has been an incidence of a suicide per semester within the IIT Campus. There appears to be no suicidal personality and hence no easily recognisable indication that a student is going to attempt suicide. The most that the college psychiatrist or counselor can do is to keep the possibility in mind that any person who is depressed may contemplate suicide and measures to alleviate his discomfort are justified.

A worrying phenomenon among adolescents for the past decade is the widespread use of drugs for pleasure, greater self understanding or escape from boredom. Current trends within the present campus reveal the maximum usage of alcohol and marihuana by the students. A current project undertaken by the author is geared to look into the incidence and dynamics of drug addiction within the campus.

Conclusion:

Those responsible for the formal planning of educational programs often question the need for mental health services. An important reason why mental health services should be available within the college structure is that 'the whole process of attaining emotional maturity should be intertwined with the development of intellectual facilities,' (Farnsworth, 1969). According to statistics found by the western models, for every 10,000 students, 1,000 will have emotional conflicts of sufficient severity to warrant professional help; 300 to 400 will have feelings of depression severe enough to impair their efficiency; 100 to 200 will become apathetic and unable to organize their efforts; 20 to 50 will be adversely affected by past family experiences and evidence character disorders; 5 to 20 will attempt suicide, and 1 to 3 will succeed; and 15 to 25 will become ill enough to warrant hospitalization (Farnsworth 1966). Even though a formal incidence survey has not been conducted by the author, past records reveal a similar trend in incidence within the IIT campus.

College Mental Health Services as a supportive facet within the campus may go a long way to check student casualities and promote mental health.

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DEVELOPMENT AND EVALUATION OF A GRADUATE COURSE IN COUNSELING WOMEN

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Much attention has been directed to raise the consciousness of helping professionals about the specific needs of female clients and the concomitant changes necessary in educational programs. The call for innovative training programs spans at least a decade from Gardner's (1971) demand that "sexist counseling must stop" (p. 705) to Worell's (1980) proposal for training specialists in counseling women. Although descriptions of workshops and courses designed to train counselors in gender-fair counseling are available (Nickerson, Espin, & Gawelek, 1982; Moore & Nelson, 1981; Thomas, Moore, & Sams, 1980), the number of published evaluations of the effectiveness of training in these procedures remains small (Gilbert & Waldroop, 1978; Gilbert, 1979).

Course Description

The course "Counseling Girls and Women" is a one semester course available to all graduate students in the Department of Counseling Psychology. It has been offered at The University of British Columbia since the academic year 1976-77. Almost one hundred students, fewer than ten males, have completed the course to date. The typical class size is 15 students.

The course is designed to be a cognitive and affective experience with the goal of improving counseling with female clients. Class time is spent in lecture, discussion, and experiential learning including structured exercises to increase awareness of the psychological experiences of female clients and role plays to demonstrate how knowledge and attitudes affect the counseling situation. Traditional and contemporary theories of psychology and mental health of women, the socialization process, educational and vocational development, and the changing roles of women are examined.

Specific course content covers consciousness raising, the effects of gender on counseling theory and practice, gender differences in socialization and development, the concept of androgyny, non-sexist and feminist intervention to facilitate counseling with women. All assignments combine the acquisition of knowledge of the psychology of women and gender roles and the personal exploration of one's own values, attitudes, and beliefs about women. The attitudes associated with feminism have been viewed as central to counseling women, more important perhaps than techniques (Johnson, 1976).

Research summaries, critiques and proposals help students learn to approach traditional and feminist research on women from a critical perspective. Many students have not taken women's studies courses previously and require the conceptual tools to understand a feminist perspective. Then, too, when women's studies courses began over a decade ago, attitude and behavior change was of primary concern whereas more recently intellectual mastery of knowledge about women and gender roles has been emphasized (Brush, Gold & White, 1978).

Concurrent with and subsequent to the counseling women course, many students desire research and practica experiences in counseling women. As a full time staff member of the Department of Counseling Psychology, the first author has been able to direct graduate research and field practica. Since the academic year 1980-81, a team of five graduate students have received credit for their practicum at a Canada Employment Commission center designed to counsel women in the labor market and women returning to work and/or school. Thus, deliberate efforts have been made to link academic work and applied field training sites.

Evaluation of the Course

Method

Subjects. Counselor trainees at the master's level at The University of British Columbia were asked to participate in the study. The experimental group consisted of 17 female students who were enrolled in the 13-week counseling women course. They had a median age of 30 (range = 23-47), and their mean number of years of background experience in the helping professions was 8.1 years. As only two male students enrolled in the course, men were not included in the study. The control group consisted of 17 female students matched on background training and years of experience, who indicated on a survey asking about elective course planning that they planned to take the course at a later date.

Measures. The Therapists' Attitude toward Women Scale (TAWS) (Sherman, Koufacos, & Kenworthy, 1978) is a 32-item Likert scale, where possible responses range from 32 - 160. Lower scores on the TAWS represent a greater endorsement of liberal and less stereotyped attitudes toward women. Coefficient alpha for the scale was .86.

Four Videotaped Counseling Vignettes (Kahn, 1980) were chosen for the present study from a pilot study using 20 counselors in the field, half of whom identified themselves as feminist counselors. The four vignettes present female and male relationship issues. Three graduate students in Counseling Psychology agreed that the four vignettes were equivalent in technical quality.

To accompany the vignettes, the Videotape Questionnaire (Kahn & Theurer, 1981) was designed. The open-ended questions on the Questionnaire were created by the authors - a Counseling Psychology faculty member and a graduate student - using the Principles Concerning the Counseling and Therapy of Women developed by the APA (1979). Areas covered by the questions include a primary component of effective counseling, empathy; an understanding of, information about, and attitudes toward gender-role issues; and counseling intervention.

The authors constructed a four-point scale ranging from 0 (no awareness of female gender-role issues) to 3 (at least two explicit and specific female gender-role issues). This scale was used to rate responses to four of the questions. One response was rated using Carkhuff's (1969) five-point scale to discriminate levels of empathy.

Three graduate students who had taken the course in counseling women in previous years and who were not informed of the questions in the present study were trained as raters using data collected from a pilot study. The Pearson Product Moment correlation coefficient was calculated between each of the rater pairs on the rating assigned to each of the vignettes independently rated by the three raters. Interrater reliabilities correlations between pairs of raters were .83, .83, and .80, showing that the raters had a high level of agreement between them about the amount of reflected awareness of gender-role issues in the subjects' responses.

Results and Discussion

Therapists' Attitude toward Women Scale. Results of a t-test revealed a significant difference ($t = 3.40$, $p < .01$) between the experimental group ($\bar{X} = 63.53$, $SD = 8.68$) and the control group ($\bar{X} = 72.70$, $SD = 6.77$) on the pre-test indicating that the two groups were not similar. This may indicate that students who are interested in women as a special needs client group already have incorporated feminist attitudes. A one-way analysis of covariance on the post-test scores ($F = 5.58$, $p < .025$) indicated a significant difference between the experimental group ($\bar{X} = 56.41$, $SD = 7.28$) and the control group ($\bar{X} = 68.47$, $SD = 8.18$). This post-test result indicates that the course may have strengthened and broadened the students' attitudes toward women, a process not occurring for students in other courses.

Videotape Questionnaire. The median test was used to test the significant differences between the experimental group and the control group using the median of the combined groups as the basis for dichotomizing the scores. The chi-square test was used to test for differences between the two independent groups on the five questions. Significant correlations for the subjects in the experimental group were found on two of the five questions, those relating to socio-cultural issues and goal setting.

The four vignettes were analyzed separately within each of the five questions. As the internal reliability of the questionnaire was of concern in this analysis, the experimental and control group subjects were combined. Pearson correlation coefficients were calculated to examine the correlations between the vignettes on each of the five questions as measured by the ratings assigned to the responses. Results revealed significant correlations, at the .05 level of significance or higher, on paired vignettes of three questions.

An inter-test correlation was done between the TAWS and the Videotape Questionnaire to examine convergent and discriminant validity. The Pearson Product-Moment correlation coefficient showed a statistically significant correlation ($r = .52$) at the .001 level of significance which strengthens the evidence for validity of each of the two measures.

The major question addressed by this evaluation is whether or not a course in counseling women designed to increase gender-fair counseling with female clients can be effective. These results indicate that educational procedures with women students can affect liberal attitudes toward women, socio-cultural understanding of women's development, and the use of active counseling interventions with female clients. Moreover, the present study lends support to the use of simulated counseling vignettes to measure sex bias in counseling.

Conclusion

The authors hope that counselor education in the psychology of women will be integrated into the curriculum so that all students benefit from the understanding of gender-role expectations to client issues. Continued development and revision of evaluation procedures and longitudinal studies of training outcomes are recommended to determine the effective components of courses in gender-fair counseling. As graduate education expands to include special material on counseling women, Worell's plea in 1980 for "carefully planned training programs that expose counselors to information, experiential activities, and feedback on their behavior in real and simulated counseling situations" (p. 479) may soon appear outdated.

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A COMPARISON OF PERCEIVED CAREER AND EDUCATIONAL INFLUENCES OF MASTERS OF BUSINESS ADMINISTRATION (MBA) GRADUATES FOR THE PURPOSES OF COUNSELING AND RECRUITING WOMEN

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(Research completed for Temple University 4/1/82)

The purpose of this investigation was to identify and analyze career choices and goals of male and female Master of Business Administration (MBA) graduates. The study compared male and female responses to questions concerning: perceived career influences, former educational curricula, demographic data, present career positions and future goals.

The information from this study is suggested for use by educators in career counseling of females interested in business; to aid colleges and universities recruit female business and MBA students; and to encourage industry to recruit and initiate an Organizational Development (OD) Plan and career counseling for female employees.

To assist in this inquiry, the study sought to compare male and female responses to the following questions:

1. What self-perceived career influences led males and females to select career paths in an MBA program?

2. How much career counseling did males and females receive in high school, under-graduate and MBA levels of education?

3. What curricula were studied by male and female MBA graduates in high school, under-graduate and MBA levels of education?

4. What are the comparative demographic profiles of male and female MBA graduates?

5. How do earnings, career ladder positions and future goals for male and female MBA graduates compare?

The population used for this study was the Master of Business Administration (MBA) graduates from Temple University and the University of Pennsylvania (Wharton) for the five-year period 1976 to 1980. The objective for choosing Temple University was for its diverse student body urban/metropolitan setting and state related status. The University of Pennsylvania's Wharton School was chosen, because it is a private institution, also, because of its diversity of students and urban setting. All of the above criteria should lend itself to data generalizations for educational institutions with similar environments and for industry as a whole.

A random sample of 500 names and addresses were selected from a population of 4146, University of Pennsylvania and Temple University Graduates, 1976 - 1980.

The hypotheses were tested by the use of a questionnaire entitled, "MBA Graduates's Survey" comprising of 40 questions. A preliminary draft of the questionnaire was reviewed by a panel of seven experts from different parts of the United States. A pilot study was conducted at the Philadelphia College of Textiles and Science MBA class consisting of twenty-five individuals. Finally, when the study was conducted a total response of 348 was received, yielding approximately a 70% rate of return.

The following conclusions are presented according to the questionnaire format for purposes of clarity and continuity, e.g.; Areas of Influence, Curriculum, Demographic Data and Job Status.

Conclusions

Areas of Influence

Males and females were similar in their perceptions of who influenced them to pursue a career in business and most specifically the MBA program. Overwhelmingly, most indicated that they were self motivated individuals with a strong interest in furthering their careers, earning a higher salary and gaining a competitive edge in the marketplace. From those few who did indicate some other influences, there was more of an influence during college years from teachers and counselors to seek a career in business. There was an obvious lack of perceived counseling from family members for both males and females.

A majority, 68%, of respondents both male and female did not receive "formal career education" of any kind while attending high school and, of this number, women, 39%, received even less than men. Throughout the questionnaire, most respondents, and especially women, expressed a vital need for career education and career counseling at all levels of their education.

Curricula

The data pertaining to curricula are interesting, but not surprising. It has been documented throughout the study that most women are not educationally prepared in many fields of study, especially business. When asking the question of the respondents, "the major areas of study for high school curriculum," it was difficult to choose curriculum terminology that would be generic to all United States' high schools prior to 1976, however, the major high school program areas used on the questionnaire were identifiable by all 347 respondents who answered the question. Therefore, the data bear out the fact that in high school and college a large percentage of females majored in what they considered to be a liberal arts track.

The write-in comments at the end of the questionnaire indicate that many of these women found themselves in "dead-end" jobs in business and decided to acquire an MBA degree in order to increase their "credibility". They found themselves at a disadvantage when competing with men in the business world because men have been exposed to the concepts of business at a much earlier age in their education.

The study indicates a significant difference between male and female MBA graduates with respect to the curricula studied in high school, undergraduate and the MBA program. This curricula difference could be the origin of many problems today pertaining to differentials in wages between males and females.

In the MBA program the data findings suggest that even though women are graduates of an MBA program they tend to stay within the realm of what is familiar. By familiar, the following is suggested: finance, 31.5%, and accounting, 11.4% were strong majors for females and one can find many women as bank clerks, accounting bookkeepers and in the lending area, all of which are lower scale paying jobs. Another popular major for females was marketing, 21.2%, and similarly women are trained to be more comfortable in people oriented jobs such as personnel and sales. Males, on the other hand, majored in the following: finance, 31.9%, management, 18.4%, computer sciences, 13.5%, and accounting, 11.7%. With these majors, males are entering general management and consulting jobs which pay higher salaries. The above curriculum data parallels data obtained from an annual MBA survey, 1980-81, conducted by the Association of MBA Executives, Inc., "Data on women MBAs were collected from 75 major MBA graduate schools and represent 1,581 female MBA graduates". The following is an example of the results:

> Along functional lines, marketing attracted the most female MBAs" 20%, followed closely by finance (18.7%) and accounting (14.2%). When comparing female MBA hires to male MBA hires, more females than males were hired into the function of personnel: 52%, representing a 5% increase over 1979.... The lowest proportion of women to men occurred in general management and consulting although both functions showed an increase in female MBA hiring in 1980. [1]

The study further indicates that female MBAs continued to earn less than male MBAs at the entry level. The survey shows in the functional area consulting, planning and general management representing the higher salaries and accounting, personnel and lending representing the lowest salaries. Women are usually represented in the three latter functions. Therefore, the conclusion can be made that even though women go on for an MBA they are still choosing areas that represent the lower end of the pay scale; accounting, personnel and lending. They do not major in management or computers even though it has been found that the highest paying positions are in consulting, planning, general management and the future for the computer industry is highly favorable. The above data, also, correspond with the data from this study in the area of Job Status.

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[1] "AMBA's 1980-81 MBA Recruitments, Placement and Salary Survey", MBA Executive, Association of MBA Executives, Inc., (Nov./Dec. 1981), p. 9.

In the section on mathematics, males and females agreed that they would have taken more mathematics in high school and college. Educators are worried about a decline in the mathematical skills of students and a modernization of mathematical curricula is in order. Reported in a recent article in, "The Chronicle of Higher Education",

> Computers abound in society and on the job, but most high-school students get little or no experience with them.... Statistics is the most prevalent field of applied mathematics, but high school students learn only the mean, median, and mode. 1

The respondents also agreed that they would have worked at a job in business in high school and college and many indicated that they had. This concurs with later written statements made by

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[1] Robert J. Trotter, "Decline in Mathematics Skills Worries Scientists, The Chronicle of Higher Education (Jan., 13, 1982), p.10.

respondents that, "work experience is necessary for successful completion of an MBA Program."

Demographic Data

The time frame of the demographic data related to age, marital status and number of children, was expressed as; "at the time of acquiring your MBA," and, therefore, presents a more distinct representation of the respondents.

The highest percentage, 65%, of the male and female graduates were 25 to 34 years of age. Their marital status was also similar showing 48% of the sample, single, and 49% of the sample, married. There were no widowers and only 3% of the sample were divorced.

The data indicate that males had more children than females, 28.7% versus 10.9% but the majority of the graduates, 81%, had no children "at the time of acquiring their MBA". This is notable since most of the respondents were between the ages of 25 to 34. The findings reveal that in the above three categories the demographics were almost simiiliar.

In the following demographic sections, "occupational and educational background of parents", there was a significant difference for males and females in two important areas. The data reveal that females' fathers possess a higher occupational level and their mothers' possess a higher educational level. This factor could be the important influencing element for those females who sought an MBA. In a study performed on high school seniors, it was found that "values specific to different status positions are important influences on levels of educational and occupational aspirations.[1] Therefore, although the females in this study did not perceive their parents as influencing their choices, the higher occupational and educational levels of their parents could have been an influencing factor in their decision to further their education with an MBA degree. Most likely this factor was more important for females than for males.

Job Status

In this section of the questionnaire data findings indicate, that males earn more than females both at the entry level job position and, subsequently, later in their careers. Since a majority of respondents in this study were between the ages of 25 to 34 when acquiring their MBA, and most of the respondents did not have children at that time; the assumption may be made that lack of work experience or family obligations should not be claimed as a factor for the differential in earnings between males and females.

Referring to the section on curriculum, the data indicate a causal effect between one´s major and one´s income. Males were the higher percentage of those who majored in finance and management and they worked as consultants and General Managers and therefore earned higher salaries. From the previously quoted national MBA survey, the following was found:

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[1] William H. Sewell, Archie O. Haller, and Murray A. Straus, "Social Status and Educational and Occupational Aspiration," American Sociological Review, Feb., 1957, p. 73.

> The gap between male and female salaries is most conspicuous when broken out into regional categories. For example, in the overall Southwestern area, female MBAs are paid up to $4,182 less than male MBAs. In New England (excluding Boston), they are paid $3,993 less and in Boston, they are paid $3,409 less than male MBAs. [1]

The only other area in which males and females differ in the "job status" section is in the type of organization they are employed. Most females were in banking, insurance, education and health services and many males answered, management, "own my own business", and "doing consulting work".

Males and females were similar in their perceptions pertaining to advancement into top management. While males were slightly more confident, the difference was not significant. A notable disclosure was that males and females had the same career goals for the next five years. When ranking these, males and females were exactly alike. They stated that they had a five year plan and intended to move into management or into a higher management level. It was not likely that they would stay with their present position if they were not promoted.

The last part of the Job Status section requested the respondents to comment on the following questions: (1) any comments regarding your MBA Program and (2) any suggestions for those counseling MBA students. The comments by males and females of both schools were similar. Most respondents stated that work experience is important for success in the MBA program. Males and females from both schools expressed a great desire for better counseling in career opportunities and career goals. Apparently, this is sorely needed along with improved job placement services. Lastly, many respondents wanted to make it clear to MBA students that the degree was only a piece of paper, "a union card", "a foot in the door", and that their success depended upon dedication and "hard work" on the job.

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[1] AMBA's 1980-81 "Survey", p. 10

PROPOSED PAPER

THE DESIGN, DEVELOPMENT AND EVALUATION OF A SUPPLEMENTARY CCTV TEACHING PROGRAMME FOR STUDENTS DIAGNOSED AS REQUIRING REMEDIATION IN PRACTICAL TEACHING SKILLS 1979 - 1983.

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This paper will consider prevailing models of teaching practice within Irish Colleges of Education and the criteria employed in evaluating teacher effectiveness. Deficiencies in existing models will be illustrated as providing the impetus for the Remedial Programme described, which commenced in Carysfort College in 1979. The contributions of Counselling, Component Skills and Microteaching approaches to remediation of practical teaching are examined in detail, and their respective inputs to the Carysfort S.T.P. Programme detailed.

Students' formative and summative evaluations of the Programme elements and their development from 1979 onwards are presented This section of the paper also includes an overview of student - staff reactions to the University of Sydney Teaching Skills Package, which has become an integral part of the Programme since 1981.

The paper will conclude with an evaluation of the effectiveness of the Remedial Programme in terms of its production of statistically significant improvements in students' teaching performance as assessed on teaching practice in schools.

FULL TEXT TO FOLLOW

ENHANCING THE READINESS OF THE SOCIALLY OPPRESSED FOR THE TECHNOLOGY EXPLOSION IN HIGHER EDUCATION

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This paper describes how concepts derived from the areas of education and mental health are blended to develop an instructional strategy to enhance the readiness of the socially oppressed for the technology explosion in higher education. The rationale for the strategy is based on an analysis of dominant American values, the recognition of the influence of one's environment on developing a readiness disposition, and the need for an individual's sociocultural and psychosocial needs to be continuously met. One aspect of this strategy is to develop within students the disposition for inquiry and discovery, the prerequisite skills for critical thinking and the necessary ingredients for one's preparedness for the technology era in education. To demonstrate how this instructional strategy is applied, preparation of Black Americans in social work education will used as an exemplar.

AMERICA TODAY

The need to enhance the readiness of the socially oppressed is obvious. Due to world-wide economic conditions and America's current and anticipated budget cuts in federal funding, citizens are experiencing a state of change and disequilibrium during this decade. Social work practitioners and educators also witness and experience these changes. This is inevitable. From its inception as a profession, social work has been concerned with assisting citizens to meet their basic human needs and improve the quality of their lives. The focus of professional education and social work practice has been, and continues to be, the enhancement of social functioning and the well-being of individuals and groups. These are the essential ingredients for human dignity and self-fulfillment, the basic ideals of the American way of life. The American ideals one strives for and the problems faced by the social work profession are related. Unequal justice, the need for more equitable distribution of power, economic resources, and services, reflect the need for the profession to improve the quality of its delivery systems and the competence of its present and future members for the technological era. This need is magnified when one considers that twelve percent of the American population are blacks[1] who, as Barbara Solomon notes, have been the object of negative valuations from the dominant American society "to such an extent that powerlessness in the group is pervasive and crippling."[2] Black social work students, practitioners, and clients have a need for readiness, which is defined as empowerment, or the ability to engage in a process in which they can reduce their powerlessness, increase their exercise of interpersonal influence, and create opportunities to reach their goals in order to be prepared to participate in today's technological society.

During the present federal administration it would not be realistic to expect that federal and state funds will be targeted for the enrichment of social work education or the development of agency based training programs which aim to prepare blacks for empowerment. Yet, efforts must be made if the social work profession seeks to improve the quality of life. These efforts must take into consideration an analysis of the political, social, and economic setting within which we prepare and train for practice. Attempts to develop a disposition of readiness within black students, practitioners, and clients in the context of today's society must accept that citizens are at the interface of political corruption, gross inequalities, high unemployment, inflation, and an energy crisis. When we place professional social work, which is dedicated to the enrichment of basic human needs and greater social functioning in today's technological society, against these political and economic realities, a problem arises. The practice of social work takes place within a society that does not always seem to place the ideals of dignity, self-determination, and human welfare as a high priority. Equal treatment under the law is not a reality in every sector of our society and different standards are applicable to American minorities as opposed to the rest of society. Direct and indirect power blocks prevent blacks the opportunities to get and use resources to more fully meet their needs. On the surface, citizens are free to compete for employment, higher salary, economic success, and to pursue self interest with minimal interferences. The belief in "inalienable rights" not only states a guarantee of free choice, but also the equality of opportunity to achieve economic security in the free market.

The realities of our technological society, however, often contradict these democratic ideals and ideals of the social work profession. Witness past government interference in the form of subsidies for aircraft corporations and parity prices for farmers; state employees' lack of input and control in the participation of their state retirement plans; professional organizations and labor unions setting rigid requirements for entrance; and government decisions to modify social security benefits or to enter a war without the consent of those who are involved. Contemporary political and economic realities reflect a discrepancy between what "is" and what "ought to be". They also represent a social class structure of those who have opportunity and those who do not. A minority's learned sense of powerlessness further widens the gap and prevents participation in our technological society.

Basic human needs, as well as the enhancement of social functioning and individual well-being in today's technological society, are achieved only when the black minority citizen has the opportunity to be a part of a process which provides for: (1) equality of opportunity to participate in making decisions; and (2) equality of obligation to abide by those decisions until they are revised or recinded. This definition of, and perspective on democracy, represents the essence and process of a way of life, rather than those ideals which takes the minority citizen's eyes off of their main source of security. It is this process which every citizen has available, and which social work education ought to prepare for. If present day political and economic realities were transformed by this process of democracy, citizens socially stratified would have greater opportunity to enjoy equality and develop a readiness to deal with and learn the new technology.

A recent article in the social work literature further illustrates how social work educators may lose sight of the obvious. June Hopps, in her editorial comments which appeared in the January 1982 special issue of Social Work, presents a coherent and logical argument for identifying blacks as a "disadvantaged group that needs preference"; she also accurately notes that our present administration is "dominated by big business and the upper class and shows little concern for people of color." In response to the question, "What can be done during this period of history?", she notes that people of color must "return to political activism and organization", "form coalitions", "register and vote", and "join with all Americans in a renewed commitment."[3] When one presents this mandate, which is realistic, required and right, to the minority group which Barbara Solomon has very passionately and vividly described as "powerless", anyone who is haunted by severe limitations of their self-determination and an inevitable sense of dependence, another serious problem arises.[4] It seems that as long as the social work profession calls for the worker to focus on intervention, we all urge black practitioners and clients to take their eyes off their major source of security - a disposition towards readiness. In the 60's the "medium was the message" and today, in order to prepare black practitioners and clients to function in a predominantly white technological society tomorrow, education programs need to demonstrate the aims of readiness by providing processes whereby student, practitioner, and client can engage in a set of activities which aim to reduce their sense of powerlessness that has been created by negative valuations by the dominant society and develop within them the disposition for inquiry and discovery, the prerequisite skills for critical thinking and the essential ingredients for survival in university and college settings.

Social work education ought to be relevant to the society it serves. With the realization that democracy and readiness are a way of life, as well as two ideals which the profession holds, our focus becomes, "How does one prepare for readiness (empowerment) and cultivate within students a disposition towards inquiry and discovery?" Since the answer to this question will ultimately focus on teaching, and since learning is part of this process, we must know about the person, the learner, before developing teaching strategies. The question "How does one learn?" is significant if social workers are to prepare the socially oppressed for the future.

HUMAN NATURE AND LEARNING

Educational philosophers such as John Dewey and Boyd Bode have made contributions regarding humankind's nature and ability to learn. Their work supports social work's unique focus on the person-environment configuration. For example, Dewey states:

> "Our position is simply that since man as an organism has evolved among other organisms in an evolution called 'natural' we are willing under hypothesis to treat all of his behaviors, including his most advanced knowings, as activities not of himself alone, nor even as primarily his, but as process of the full situation of organism - environment; and to take this full situation as one which is before us within the knowings, as well as being the situation in which the knowings themselves arise."[5]

Dewey called this process transaction. Following the same pattern, Boyd H. Bobe states:

> "The common element...consists in the fact that we learn the meaning of our environment by discovering what things mean to others. As a result of each learning, the individual is enabled to use things for his own purpose, to act with reference to others either by cooperating with them or by exploiting or opposing them, and, finally to shape his conduct towards the end of conserving a maximum of the values or interests that may be involved in a given situation...the purpose of others are thus transformed to some extent into purposes of the learner."[6]

If a person is considered to be transactive and either "cooperates" or "exploits as a result of discovering what things mean, then one may learn to be powerful or powerless. Behavior and one's dispositions may be dependent upon the person's relationship with the environment. It is not necessarily the drill and repetition that establish learning and firm linkages or connections but "...the institution of effective integrated interaction of organic - environing energies - the consummatory close of activities of exploration and search...(which is) of flexible capacity to undergo further modifications as the organism meets new environing conditions."[7] Learning about empowerment then, results from the process of search or inquiry.

For social workers to fully comprehend the significance of educational philosophy for empowerment and our technological society, it is necessary to make an analogy with crisis theory. If this analogy is accepted, then the implications for the teaching of empowerment, and thus the enhancement of readiness, are more clear. A crisis is a new and unique situation that an individual must resolve for greater social functioning. An individual in a state of equilibrium is suddenly confronted with a situation that is new and different; there is a need to resolve the problem but old ways of coping do not work. The individual then goes through a process of utilizing all available resources, psychic and external, to find new ways to coping. When there is a solution changes take place in one's coping mechanisms and equilibrium returns, both internally to the individual and in relationships to the environment. Dewey suggests a similar process in learning. He says:

> "For inquiry grows out of an earlier state of settled adjustment, which, because of disturbance, is indeterminate or problematic...When the search is successful, belief or assertion is the counterpart, upon this level, of redintegration upon the organic level."[8]

Learning and inquiry develop from a "search", an experience. An experience is both active (doing) and passive (undergoing). When active it can be considered as an experiment; when passive that which acted upon "does something to us in return."[9] Dewey suggests:

> "When an activity is continued into the undergoing of consequences, when the change made by action is reflected back into a change made in us, the mere flux is loaded with significance. We learn something...the undergoing becomes instruction - discovery of the connection of things."[10]

Learning to develop a disposition towards empowerment, which will contribute to minorities being more ready for the technological era, is dependent upon "experiences" when the individual is faced with a need or; a problem, he/she transacts with the environment, experiments, discovers or sees the linkages, and is ready for "new environing conditions that occasion new problems."[11] This implies that learning is a never-ending process and that discovery or "seeing" is the essential ingredient for an educational activity to be meaningful and to prepare for empowerment. Emphasis must be placed on the experiential aspects of learning and training if we are to develop a sense of readiness.

By doing and undergoing one learns something and "belief or assertion is the counterpart". Knowledge is the resultant product of inquiry. It develops as a result of inquiry from problematic situations. Since knowledge stems from doing and undergoing, it owns an experiential characteristic and, as such, it is subject to both error and further experiments. It is never final or absolute. It is "truth which has been discovered...(and) held in the mind and believed."[12] Educational experiences which aim to develop a disposition towards empowerment need to be subject to trial and error because empowerment or readiness is knowledge, practical skill, that is being developed.

For subject matter or facts to be of value to the student they must be appreciated. However, subject matter in itself has no intrinsic value. It cannot explain itself or be prized. When training material and facts are used in the inquiry process and choices must be made between them to alleviate a problem situation in a learning environment, they then become valuated and judged and serve an instrumental value, permitting new knowledge to be discovered. This process of valuation acts in the formation of one's value system and contributes to a positive sense of self. Valuation provides new knowledge as a "norm" from which change in knowledge, therefore, future valuations can be made. It demonstrates the intrinsic worth of the dynamics which lead to learning and change in discovery. Discovery and valuation, learning and decision-making, seem to be two fundamental capacities of human nature and prerequisites for personal survival in a technological era.

These same intellectual dynamics which must take place in academic settings are also necessary for the black social work practitioner. In the many roles of a change agent, the practitioner helps individuals or groups cope with their personal troubles or public issues, and functions as an initiator of change against institutions which cause these problems. The practitioner, as change agent, helps clients deal with change and acts as an initiator to bring about change in the political and economic arena to ensure equality of opportunity to make decisions. The selection of contrasting roles present problems for the practitioner who must make judgments regarding which role to emphasize. Training "experiences" must prepare the social worker to make decisions.

For social work students, practitioners, and clients to make decisions, knowledge should not be determined solely by classroom theory or training materials.

It ought to be a subjective perception of reality based on discovery and valuation. Although factual items may assist the student to organize thoughts in a new way, it is the student's human "experiences" with the theory or facts which permits the student to accept it and make it part of the cognitive organization.

AIMS OF SOCIAL WORK EDUCATION

As a profession concerned with the enhancement of social functioning, social work must meet the learning needs of its socially oppressed students and practitioners if they are to function in a society that "should be", rather than maintaining the status quo of a society "that is". Social work education ought to provide opportunities to develop those fundamental capacities of human nature, discovery and valuation, in order to live as a citizen and a professional in a democratic and technological society that ought to be.

Democracy and empowerment, each as a process, require rational evaluations for a professional in making decisions regarding the assessment of problems and the selection of a change agent role, as well as the ability to make responsible decisions as a citizen. Social work education, therefore, ought not indoctrinate students with absolutes or answers to problems. It ought to provide students with real and meaningful problem situations to solve in order to develop a disposition of empowerment, i.e., the ability to develop adequacy of outlook in light of obtainable data and logical consistency in actions given this data. The ability to resolve problems, particulary when there are no prior guides for solutions, is a necessary feature in our democratic society where black citizens and practitioners are ultimately the producers or change agents of their lives. The processes of discovery and valuation which lead to this aim, demonstrate the significance of providing opportunities for students, practitioners, and clients to learn to work with new instructional technology by "doing and undergoing". It is the process of inquiry with discovery which ought to be the criteria and valued, and not"... some illusory 'end' for which things are taught."[13] If the social work professional wants to cultivate within students, practitioners, and clients the disposition towards empowerment and a readiness for the age of technology in higher education, then the following remarks by Carl Rogers may strengthen these efforts. Rogers states:

> "It has gradually been driven home to me that I cannot be of help to this troubled person by means of any intellectual or training procedure. No approach which relies upon knowledge, upon training, upon the acceptance of something that is taught, is of any use. These approaches seem so tempting and direct...It is possible to explain a person to himself, to prescribe

> steps which should lead him forward, to train him in knowledge about a more satisfying mode of life. But such methods are, in my experience, futile and inconsequential. The most they can accomplish is some temporary change, which soon disappears, leaving the individual more than ever convinced of his inadequacy."[14]

Students, practitioners, and clients in a society which "should be" cannot fulfill their responsibilities or seek to understand technological advances when they are certain of their "inadequacy".

READINESS FOR THE TECHNOLOGICAL ERA

The society which "ought to be" depends on equality of citizen participation in making decisions for the resolution of problems. The processes employed by an individual as social work student, practitioner, or citizen in making decisions for both problem solution and empowerment are identical. The type of teaching method we employ should be one which develops this capacity. Dewey describes the method as follow:

> "The essentials of method are therefore identical with the essentials of reflection. They are first that the pupil have a genuine situation of experience - that there be a continuous activity in which is is interested for its own sake; secondly, that a genuine problem develop within this situation as a stimulus to thought; third, that he possess the information and make the observations needed to deal with it; fourth, that suggested solutions occur to him which he shall be responsible for developing in an orderly way; fifth, that he have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity."[15]

This method requires that the physical facilities and material available for training should be conducive for life-like inquiry and decision making. It requires trainers who are fully qualified in subject matter and who bring rich practice experiences in empowerment. It requires that the trainer be provided the freedom by administrative authority to fully devote time and energy in pursuit of educating for empowerment. It also requires the use of an instructional strategy which synthesizes this educational philosophy to guide educators towards developing others with the disposition of empowerment for technological readiness.

Gerald Caplan in his book, Principles of Preventive Psychiatry, presents several simple, but powerful, concepts which are relevant for constructing an instructional strategy.[16] In his discussion on primary prevention, Caplan introduces the concept of "provision of supplies" and states that individuals in our society need continuous provisions of physical, psychosocial, and sociocultural supplies for normal physical and emotional growth and development in order to be prepared to cope with life's crisis situations. The physical supplies include nutrition, clothing, shelter, sensory stimulation, and bodily exercise; the psychosocial supplies refer to the fulfillment of one's interpersonal needs through opportunities for healthy relationships with family members, peers, and significant others; the sociocultural supplies are the custom and value expectations which one's culture has on its members "actions and feelings about himself."[17] These same provisions of supplies may be considered in the development for education programs if one is to prepare for readiness, empowerment. Through training programs, a purposeful regard for these provisions may minimize the development of powerlessness (primary prevention), reduce its intensity if identified at an early stage (secondary prevention), or maintain the current functioning level of the student, practitioner, or client (tertiary prevention) and therefore contribute for one's readiness to meet the demands of the new curricula. The following paradigm, which is based on the previous discussions covering the relation between learning and empowerment and guided by Caplan's concept of provisions of supplies, considers the nature of society, the learner, the process of learning, knowledge, and the future. It is presented as one way to prepare minority practitioners, clients, and students to enhance their readiness by developing the disposition of empowerment. Attention will be on providing the psychosocial and sociocultural provisions of supplies to prevent the development or spread of a disposition of powerlessness.

READINESS PARADIGM

The Nature of Society

1. Premise for Readiness:	In a democratice society, solutions to most problems are conceived and carried out by groups of individuals working together.
Training Strategy:	Minority clients, practitioners, and students should have opportunities to solve problems with others and recognize that each student's unique contributions lend to the development of the final product.
Provision:	Psychosocial
2. Premise for Readiness:	In a democratic society, citizen fulfill differing roles, each role contributing towards group or individual satisfactions.
Training Strategy:	Minority clients, practitioners, and students should be given opportunities to experience different roles and responsibilities in differing types of racial and cultural groups, in order to prepare for

differing group roles as professionals and citizens in a technological era.

Provision: Psychosocial, sociocultural

3. **Premise for Readiness:** In a democratic society, citizens have the right to participate in making those decisions which affect them.

Training Strategy: Minority clients, practitioners, and students should be provided opportunities to work with others in making decisions which affect them.

Provision: Psychosocial

The Nature of the Learner:

1. **Premise for Readiness:** All human beings are unique individuals who develop at different rates and have differing needs.

Training Strategy: Training must provide opportunities for students to be unique individuals while satisfying their needs and helping them meet the training objectives.

Provision: Psychosocial

2. **Premise for Readiness:** Relationships are basic to the learning that takes place to fill human needs.

Training Strategy: Training should provide opportunities for students to be accepted, loved, and respected by others and self.

Provision: Psychosocial

3. **Premise for Readiness:** Individuals need to see themselves positively and develop positive self images.

Training Strategy: Opportunities for success in the use of computers and other technological advances should be provided in social work training for empowerment.

Provision: Psychosocial

The Nature of the Learning Process

1. **Premise for Readiness:** Individuals learn and retain more when they are actively involved and engaged in the learning process.

Training Strategy: Education must provide experiences to participate and learn by doing and undergoing.

Provision: Psychosocial and/or sociocultural

2. **Premise for Readiness:** Individuals learn more effectively when they are encouraged to inquire to solve problems, arriving and testing solutions.

Training Strategy: The training program should provide for inquiry learning situations with the use of the new technological advances available.

Provision: Psychosocial

The Nature of Knowledge

1. Premise for Readiness Individuals gain a deeper sense of self when they can recall knowledge from the past and use it in the future.

Training Strategy: The training curriculum should facilitate integration of past life experiences, professional skills, and the new technology with the problems to be addressed.

Provision: Psychosocial and/or sociocultural

2. Premise for Readiness: Individuals, as autonomous and fully developed selves, need to know how to acquire new knowledge.

Training Strategy: Training should provide learning experiences that teach participants the process for acquiring technology oriented knowledge.

Provision: Psychosocial

The Nature of the Future

1. Premise for Readiness: Individuals have the power to shape their future.

Training strategy: Students working as individuals or in groups, which are composed with similar or different minority members, should be provided opportunities to experience the shaping of their future with the use of the new technological advances.

Provision: Psychosocial and/or sociocultural

2. Premise for Readiness: One's image of the present predict future actions.

Training Strategy: Trainers need to assist participants to identify the strengths and limitations of their present technological society in order to help them form realistic images upon which they can creatively predict and plan for the future technological society.

Provision: Psychosocial and sociocultural

This strategy is concerned with providing the psychosocial and sociocultural provisions of supplies which would facilitate minority practitioners, students, and clients to develop a disposition of readiness, empowerment. Its focus is on developing the skills of inquiry and discovery, the prerequisites for one to feel empowered, to engage in critical thinking, and to be ready for the technological age. While this strategy acknowledges the importance of decision making in shaping one's future, it also suggests that the future of each individual and our society, will be greatly influenced by what, as a people, we believe and by decisions being made now. Hopefully, this framework will be tried as one way to enrich the decision making abilities of the socially oppressed to enhance their readiness for the future.

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A MODEL FOR EVALUATING THE COMMUNICATION SKILLS OF COLLEGE STUDENTS

by

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Introduction

Wayne State College recently took two very important steps toward improving its general education offerings. The first was the establishment of an ad hoc Committee on General Education, which was charged with examining and reporting the outcomes of a general education program review and the second was the participation in a national research project. These two steps resulted from a longstanding commitment toward improving general education at Wayne State College. However, with limited institutional resources at our disposal, we found the evaluation of the general education program to be a more difficult process than was expected.

When the Academic Program Evaluation Project (APEP), under the sponsorship of the Resource Center for Planned Change (RCPC) of the American Association of State Colleges and Universities (AASCU) and supported in part by the Fund for the Improvement of Post-Secondary Education (FIPSE), was announced, we still did not know how well we were promoting basic academic skills and did not have an effective means for making that determination. Therefore, we were eager to participate in the AASCU Project, which provided resources that would not normally be available and allow for a more intense and more widespread evaluation of our general education program than would otherwise have been possible. Thus, Wayne State College submitted a proposal titled "Fulfilling a Deferred Commitment: Evaluating Program Effectiveness in General Education--The Role of Wayne State College" to the Resource Center for Planned Change of AASCU for consideration. We were notified shortly thereafter that Wayne State College was one of the ten institutions selected nationally to participate in the AASCU Project and immediately formed an institutional APEP Committee.

It was decided that the Committee should include a faculty member from each of our eight academic divisions as well as four student representatives. Faculty members were selected by each division in consultation with the Faculty

Senate, the APEP Project Director, and the APEP Project Coordinator. The Committee agreed that at some future date three additional faculty members would be selected to comment on and provide constructive criticism regarding progress toward the project's goals. Both the faculty and the administration considered it especially important to have representatives from every academic division on the Committee so that the project would be recognized as being the concern of the entire campus. It was also felt that faculty members on the Committee should, as far as possible, be remunerated from project funds for work beyond that which would normally be considered a part of their regular duties.

Stage I

The first stage of the project, and therefore the first task for the Committee, was to arrive at definitions of those basic academic skills that a general education program should promote. The remainder of this paper will focus on one of these basic skills, namely, Communication.

A major concern of the Committee as they undertook this task was that the definition not reflect any indication of where in the curriculum the skill should be taught. For example, we did not want to assume in our definition that communication was solely the concern of the English department. It was also felt that the definition arrived at should not be so broad and general as to be useless for the purposes of the project.

The Committee decided that it would allow its members substantial time to consult with colleagues in their respective divisions and to clarify and formulate their own notions of communication. After discussing each other's definitions, members could then rethink and refine their own definitions for a future meeting until some agreement could be reached.

The process of defining the basic terms proved to be a difficult task and in initial discussions there was considerable disagreement. Two major objections to the kinds of definitions presented were raised. The first was that some Committee members had written definitions in terms of their own disciplines rather than definitions that would apply to general education. One member observed that, even within a given discipline, such definitions might result in our setting higher levels of student achievement than those we would expect from general education students. The second objection was that some of the definitions contained too much jargon which obfuscated rather than clarified the terms in question.

The problems involved in agreeing to the meaning of "communication" in many ways typified those encountered in attempting to define each of the other basic skills that were ultimately addressed. A number of the initial definitions focused on written and oral communication or implied that these were the only means of communication. There were objections to these definitions because they excluded non-verbal methods of communication and made no provision for communication through scientific languages. Under these definitions, for example, the kind of message included on the Voyager satellite and designed to give some notion to our world to an extraterrestial civilization--that is, the pictures, music, and equations which scientists included--would not be considered a means of communicating.

After revision and rewriting, the following working definition of "communication" was developed:

> Competence in communication, in a very broad sense, involves all those procedures that allow an individual to express him/herself effectively. Within this broad range two distinct, though clearly related, types of competence may be identified. The first type is verbal competence. It is the ability to speak and write clearly and effectively. The second type is non-verbal competence. Skills in this area are displayed in a variety of non-verbal systems of codification, which range from aesthetic symbols to gesture and digital language systems. From this definition it follows that effective communication is a form of human behavior that may be exhibited in a variety of media and contexts.

(It should be noted that this definition was considered tentative by the Committee. Members felt that it would be better to have a working definition rather than a formal one, not only because of the difficulty of achieving a consensus but also because they expected that their own understanding of the complex terms involved would improve during the course of the project.)

Although there was some controversy over the definitions of the basic terms under consideration in the project, several members of the Committee felt that the process of attempting to define the terms would, in the long run, be as valuable as the definitions ultimately agreed upon since this process would force an examination of their division's and their own individual roles in general education at Wayne State College.

Stage II

The second stage of the project dealt with establishing criteria for determining whether or not students had acquired the basic skills that general education should promote. The goal in this stage of the project was for the Committee, in consultation with the administration and the faculty-at-large, to determine the level of performance expected of undergraduates at Wayne State College. Some criteria were established but, in view of the revisions of the definitions, these also needed to be revised.

Stage III

The third stage of the project required the development of a procedure to determine whether, where, and to what extent undergraduates at Wayne State College were acquiring skills in communication. As part of the basis for determining which students and how many students would be selected for testing and to assist in future decisions regarding the curriculum, statistics relating to the general education program were gathered during this stage of the project. The data collected included enrollment statistics for selected key general education courses offered during the last three years including the number of sections offered, total enrollment, student-credit-hour production, and average section size, etc.

The next concern of the Committee was the testing process to be used to determine the levels our students had achieved in the particular skill area in question. At first the Committee favored using some sort of "objective" test, such as that devised by the Educational Testing Service (ETS). However, in the Committee's discussions several objections to relying on this or similar tests as the primary method of testing arose. It was noted that these tests had their own kind of subjectivity and that assuming the objectivity of an "unproven" test could be misleading.

Perhaps a more serious objection was that such tests were necessarily obtrusive and intrusive. If they were given during regular class hours, they would take time from classroom instruction and many of the faculty would find it difficult to surrender such time. Thus, we might not get as wide a sampling as we would like. It was also felt that such a process might be detrimental to the spirit of cooperation and participation that we had attempted to foster throughout the project.

Another objection was that even if sufficient faculty support was extant, there was a likelihood that we would have difficulty eliciting sufficient and appropriate student responses. If students were forced to take the tests in a given class, they might not attend the class or they might take the test but not take it seriously. Student members of the Committee were also concerned that the testing of students for proficiency in the various skills would constitute a repetition of the kinds of testing they underwent in some of their courses, especially a course such as Freshman Composition. Although they were assured that this would not be the case, there was little doubt that some, if not many, of our students would perceive an additional battery of tests in a negative light.

On the other hand, it was felt that if students were asked to volunteer to take the tests, we might not get a large enough sampling to make the results valid for evaluating the general education program as a whole. In addition, those students who might volunteer would most likely be those who would feel most comfortable taking the tests and, therefore, those most likely to do well on them. This would influence the results since this self-selected sampling of students would be of above-average ability thus invalidating any conclusions we might attempt to draw.

One further consideration was that even if this kind of testing could be administered in such a way as to provide a valid indication of whether or not our general education program was successful in promoting the defined skill, it could not provide some of the basic information we were seeking in the AASCU Project. From its initiation, one of the aims of the project had been not only to seek information on whether students were acquiring certain fundamental skills in their general education courses, but also to discover where in the general education program these skills were being promoted. The Committee felt that we would not be aided in obtaining this information by administering tests such as those prepared by the ETS or by administering similar tests, whether prepared by an outside body or by our own faculty.

After much consideration, consultation, and discussion, the Committee felt that the only type of testing that would help us to obtain all the information needed would be something associated with regular courses and judged on the basis of promoting the defined skills rather than on the basis of the specific objectives of those courses. It was decided that the least obtrusive and intrusive way of gathering this information would be to collect papers, tests, and quizzes, etc., written for specific classes. This procedure assured that students would take tests seriously and do their best on assignments since they counted toward their course grades. It was, in short, a non-obtrusive method of gathering data and did not intrude on the normal functioning of the class since no time was taken away from classroom instruction for administering extra tests.

Students' names were removed from papers before they were evaluated so that they would have no fear of repercussions for poor performance and, while some of the faculty might have felt threatened by having their assignments and their students evaluated, most understood that the results were not to be used to judge or criticize individual instructors. As a result, approximately 50 percent of the faculty contributed materials for evaluation and the process of gathering materials continued throughout the entire semester.

We were aware that in this method of evaluation there might be some pitfalls which had to be avoided. For example, it was always kept in mind that the material gathered was not being judged as an assignment for a chemistry, history, math, or art course but rather as an indication of the ability to communicate. Therefore, the material was not judged by the professor submitting it or even by those in the same discipline (though these professors might have been consulted by the evaluating committee). It was our intention to establish mini- or sub-committees from the faculty-at-large to determine both whether the tests or assignments demanded of the student an ability to communicate, and whether the students had, in fact, demonstrated this ability.

It was also important that consistent criteria be used in evaluating all of the material gathered. The APEP Committee, with the assistance of the sub-committees, finalized the criteria to be used and developed a systematic method of evaluating these criteria. This provided a readily comprehensible means of reporting the results of our evaluation.

In addition to providing more of the information we needed, the method of testing we decided upon had several other advantages. First, it drew upon the expertise of our own faculty and required the participation of a greater number of the faculty--both as contributors of material and as evaluators of that material. This made the AASCU Project at Wayne State College more of a concerted effort and perhaps made the faculty as a whole more understanding of its aims and more willing to accept and implement changes that the project determined our curriculum needed. Our method also made more of the faculty aware of the necessity to promote the defined skills and of how this could be done in a variety of courses. It was hoped that this might lead to greater respect and cooperation among colleagues and more awareness among the faculty of their colleagues' problems. For example, those who never assign essays in their classes became more conscious of the difficulties encountered by those who do so regularly.

In short, by approaching our evaluation process with an awareness of the possible pitfalls involved in it, we believed we could minimize those pitfalls and capitalize upon its advantages.

Stage IV

In Stage IV of the project, our key objectives were to form faculty evaluation committees to deal with the large amount of material collected and to finalize the criteria by which the student material was to be evaluated. The following summer was devoted to the evaluation of this material and reports from the committees were submitted to the Project Coordinator.

The sets of tests, quizzes, essays, midterm and final evaluations, projects, etc., were catalogued in the Graduate Office and made available to members of the Communication Skills Subcommittee.

Each subcommittee member selected sets of performance data which seemed to manifest specific skills, and each student's performance was evaluated on a Likert-type scale ranging from not effective (1) to highly effective (5).

Subcommittee members recorded this information on a specially designed evaluation form; one form per set of materials evaluated. These forms were then collated and summarized along with the forms of the other members of the specific skill subcommittee. A statistical summary of the Committee's findings is attached.

In order to achieve as high a degree of consistency as possible in evaluating the student performance data, the communications subcommittee:

1) Held several meetings to determine the specific evaluation criteria to be applied to each set of data;

2) Examined numerous sets of student performance data to come to consensus on which sets best manifested performance to be evaluated by the committee;

3) Conducted several "trial runs" to determine how consistently each subcommittee member's evaluations compared with others.

To add another dimension toward achieving consistency, the mean score of attained skill level by each evaluator was determined.

In addition to the statistical information previously referred to, the Communication Skills Subcommittee decided to computerize its evaluations and to add 20 questions to help gain insight into less quantifiable but, nonetheless, very significant information. The results of this technique are attached.

From a research perspective, two major questions that arose were: Will the data be valid; that is, will it measure what it claims to measure? And, will the data be reliable; that is, will it measure accurately and consistently from one time to another?

In addition, we considered the matter of internal validity (whether the observed occurrences were influenced by extraneous or uncontrolled factors) and external validity (whether the systematic relationships that were to be identified could be generalized--that is, used to predict relationships outside the Wayne State setting).

Another issue that was considered in the analysis of the data was that of the role of intervening and extraneous variables (those that could not be controlled or measured directly but might have an important effect on the outcome of the project).

Stage V

The objectives of Stage V of the project were to evaluate the data on student performance and determine the students' level of skill attainment consistent with the role and mission of Wayne State College, to remove discrepancies between desired and actual levels of student attainment, and to reenter various project stages if definitions needed modification or if new assessment/evaluation procedures needed to be adopted.

The assessment design developed by Wayne State College defined the parameters of the evaluation approach which sought to determine the extent to which our institution promoted undergraduate competence in communication skills. In other words, based on our approach to assessment, faculty members should have been able to identify and, perhaps, design measures that demonstrated how well Wayne State had accomplished its goals for student achievement in this particular skill area. In this regard we attempted to: 1) specify where and to what extent in each academic division, this skill was being promoted; 2) specify appropriate measures for this skill area, ranging perhaps, from unobtrusive measures to formal testing to expert judgment; 3) design and/or identify the necessary and appropriate administrative structure to carry out the evaluation plan.

In addition, decisions must continue to be made after the final analysis of student performance data regarding the remediation of any discrepancies between the real and the ideal levels of student performance. Determinations that identify whether such discrepancies are extant because of a lack of appropriate resources, an inappropriate curricular program, or an ineffective curricular design must continue to be made. In order to minimize these discrepancies, institutional policies and procedures must continue to be examined and modified by institutional consensus in light of student performance.

As a result of the AASCU Project, all of us at Wayne State College have been made conscious of the complex issues involved in evaluating and improving our general education program. Many on campus have, despite the difficulties, committed themselves to this improvement. Perhaps most important, there has been a good deal of exposure regarding our problems and our goals. The Project Director and the Project Coordinator from the very beginning of the project, consulted regularly with the Faculty Senate, the Futures Planning Committee, and the Division Heads. The Project Director kept the Nebraska State College Board of Trustees informed of our progress while the Project Coordinator kept the faculty up-to-date and spoke to various educational groups about the project. Faculty members shared their ideas and opinions with the AASCU Committee and with their other colleagues. It is hoped that this heightened awareness, coupled with our measurement of student achievement and our continuing analysis of our general education offerings, will lead to an accurate evaluation of where we are and ultimately to the synthesis that will improve general education at Wayne State College and, perhaps, other colleges as well.

COMMUNICATION SKILLS

DATA SUMMARY

Number of Course Evaluations = 34

Number of Different Evaluators = 4

Number of Student Evaluations = 868

Overall Mean of Attained Communication Skills = 3.38 on a scale of 1-5, one being ineffective and 5 highly effective

Mean Score of Attained Communications Skills:

General Education Courses = 3.41, n = 501

Non-General Education Courses = 3.33, n = 367

Mean Score of Attained Communications Skills by Course Level:

100 level = 3.38 Student n = 581
200 level = 3.33 Student n = 254
300 level = 3.76 Student n = 33
400 level = -- Student n = 0

Mean Score of Attained Communications Skills by Division.

App. Sci. = 3.44, n = 317
Business = -- , n = 0
Ed/Psych. = 3.90, n = 11
Fine Arts = -- , n = 0

HPERA = 3.23, n = 202
Humanities = 3.39, n = 235
Math Sci. = 2.97, n = 48
Soc. Sci. = 3.74, n = 55

Mean Score of Attained Communications Skills by Each Evaluator:

Evaluator A = 3.18, n = 312
Evaluator B = 3.52, n = 311
Evaluator C = 3.35, n = 234
Evaluator D = 3.94, n = 11

MEAN RESPONSES TO SPECIFIC COMMUNICATIONS QUESTIONS

(Highly Effective = 5; Not Effective = 1)

1. Are the student responses in technical or scientific language?

   25 yes   811 no

2. Are the student responses in non-technical or non-scientific language?

   780 yes   62 no

3. Are the student responses in both types of language?

   86 yes   752 no

4. Do the responses convey information and ideas clearly?

   $\bar{X}$ = 3.55   n = 749

5. Do the responses convey information and ideas coherently?

   $\bar{X}$ = 3.30   n = 704

6. Do the responses convey information and ideas correctly?

   $\bar{X}$ = 3.08   n = 766

7. Do the responses convey information and ideas concisely?

   $\bar{X}$ = 3.41   n = 751

8. Do the responses convey information and ideas in an organized manner?

   $\bar{X}$ = 3.30   n = 734

9. Do the responses convey information and ideas in a manner that is appropriate to the context?

   $\bar{X}$ = 3.45   n = 767

10. Do the responses convey feelings, attitudes, and values clearly?

    $\bar{X}$ = 3.47   n = 451

11. Do the responses convey feelings, attitudes, and values coherently?

    $\bar{X}$ = 3.28   n = 450

12. Do the responses convey feelings, attitudes, and values correctly?

    $\bar{X}$ = 3.06   n = 452

13. Do the responses convey feelings, attitudes, and values concisely?

    $\bar{X}$ = 3.37   n = 446

14. Do the responses convey feelings, attitudes, and values in an organized manner?

    $\bar{X}$ = 3.30   n = 452

15. Do the responses convey feelings, attitudes, and values in a manner that is appropriate to the context?

    $\bar{X}$ = 3.46   n = 422

16. Do the responses indicate that the respondent has received and understood the information and ideas conveyed through speech and writing?

    $\bar{X}$ = 3.45   n = 785

17. Do the responses indicate that the respondent has received and understood feelings, attitudes, and values conveyed through speech and writing?

    $\bar{X}$ = 3.46   n = 473

18. Do the responses indicate that the respondent has received and understood the information and ideas conveyed through art, literature, and music?

    $\bar{X}$ = 3.37   n = 149

19. Do the responses indicate that the respondent has received and understood the feelings, attitudes, and values conveyed through art, literature, and music?

    $\bar{X}$ = 3.41   n = 151

DEVELOPING FORMAL THINKING SKILLS AT THE COLLEGE LEVEL

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__Introduction__. The fact that a substantial number of students--many of whom are not remedial students--begin higher education programs without having developed the ability to think abstractly in their various subject areas (see, for example, Griffiths, 1974) has made the question, "How can we teach students to think?", a pressing one for postsecondary educators. And, this question becomes even more pressing given the research which indicates that a significant proportion of attrition at the postsecondary level is ascribed to academic failure or academic ineptitude (Wilder, 1981).

Heretofore, much of the research and program generation efforts concerned with the development of formal--abstract--thinking abilities have been directed toward the early and middle adolescent age groups. However, with recent research studies which indicate that development of abstract thinking abilities continues well into late adolescence (see, for example, Shayer __et al__., 1978, 1976), and probably does not have an age limit to development, these efforts have extended to other groups. Specific strategies which help college students develop abstract thinking skills are beginning to be planned and implemented (Chaffee, 1980; Illinois Central College, 1979; Williams, 1978).

The purpose of this paper it to indicate why--based on a synthesis of research findings--strategies planned and implemented by discipline and in terms of students' cognitive development are probably the best approach for helping students, who move into the postsecondary level still at the stage of concrete thinking, develop abstract thinking skills and to describe--also based on a synthesis of the research--an approach which can be effective for planning and implementation of strategies.

Formal--Abstract--Thinking. The formal operational--abstract--thinker is one who (a) can engage in a continuous dialog between the possible and the actual, that is, can set up an hypothesis or problem, consider several potential solutions, and make a judgment on that one which best justifies the hypothesis or solves the problem; and (b) has the ability to think about thought, that is, to know and be able to reflect on what he is doing--and why he is doing it--when he is thinking and to evaluate the processes and outcomes of thought (Inhelder & Piaget, 1958; Piaget, 1972, 1952).

Formal operational thinking does not develop automatically; the skill must be learned. The individual has a competence, but not necessarily a performing ability (Day, 1981; Stone & Day, 1980). And, while many curricula, texts, and educators assume that by the time an individual is in high school he has developed the ability to think formally, research indicates that a relatively small proportion--for example, in Shayer's studies 30% of the top 20%--have done so (Shayer et al., 1978, 1976). In the same articles, Shayer notes that development of formal thinking is likely to continue into late adolescence, the age at which most students are beginning postsecondary education.

Acquisition of formal thinking skills is gradual. Among students at the beginning stages of formal thinking intra- as well as interindividual differences can be observed as each develops the potential differentially among subject areas depending, in part, on background of concrete experiences with the material of each discipline as well as, but equally important, facility with the language of each discipline. For example, a student with a solid background of concrete experiences and language fluency in mathematics, may be able to think at an abstract level in that subject before being able to do so in history or sociology where his or her experiences and language fluency are more limited (Stone & Ausubel, 1969).

Factors in the Development of Formal--Abstract--Thinking.

(a) ... a continuous dialog between the possible and the actual. Four points related to the development of formal thinking are important to consider (Inhelder & Piaget, 1958).

(1) Formal thought has its base in appropriate concrete experiences related to a discipline. Individuals internalize representative copies of external events (concrete thinking) so they are capable eventually of internal representational knowing (formal thinking). To work successfully through problems or tasks requiring hypothetical or formal thinking, students must have stores of principles, concepts, and problem solving strategies from which to select. These pools of knowledge and understanding develop from familiarity with the concrete reality of the discipline. Therefore, students need to have --or have had--adequate, appropriate concrete experiences in disciplines if they are to move to formal thinking in any one. The need for such experiences may vary from discipline to discipline for individual students, depending on previous experiences.

(2) Language is the tool of thought for formal thinking. Language becomes the medium to stimulate and express thinking. Linguistic symbols replace concrete objects in thought and immediate concrete referents no longer are necessary for thinking. Therefore, students need to know the languages of the disciplines and to be able to use them with precision. For example, it is easier to discuss opposing viewpoints when arguments are well articulated than when they are based on unanalysed assumptions vaguely expressed.

(3) Formal thought develops through exploratory manipulations (mental or physical), that is, through practice in developing and testing hypotheses. Certain cognitive abilities, such as capacities to understand and use proportion and correlation, and operations of disjunction, implication, and conclusion are

particular to formal thinking. But, the abilities become effective in thinking only through exercise; through reflective practice.

(4) A relative lack of differentiation between individuals' own and others' points of view or between subjective and objective in thought is evident at the early stages of formal thinking. Students need practice in testing-out their ideas against ideas of others, in seeing both sides of an argument, and in recognizing good and poor arguments, as well as practice in evaluating the processes by which they have completed one or the other of these kinds of tasks. Students need to know and become fluent in the inquiry strategies of each discipline.

(b) ... ability to think about thought. As Keating (1980) points out, one of the ways in which the capacity to think about thoughts changes at adolescence is in the potential for metacognition or self-knowledge about the cognitive ability itself and about the processes which make it function. Metacognition "... refers to one's knowledge concerning one's own cognitive processes and products or anything related to them. ... For example, I am engaging in metacognition ... if I notice that I have more trouble learning A than B; ... if I think to ask someone about E to see if I have it right. ... Metacognition refers ... to the active monitoring and consequent regulation ... of these processes in relation to the cognitive operations on which they bear(Flavell, 1976, p. 232)." Again, one is faced with the fact of potential but not necessarily competence; the skill must be learned. Yet the skill of metacognition is basic to effective abstract thinking.

The Project Approach. Thus, students moving into the postsecondary level still at the stage of concrete thinking need--if they are to move to abstract thinking --involvement with continuous, planned, active, and hierarchical concrete experiences with the materials of each discipline and with the language of each discipline, as well as interactive experiences in the instructional environment. The latter does not appear to be a common practice in the college class. For example, one study found that less than 20% of college class time is spent in student participation and encouraging student involvement (Smith, 1980).

The practice needed for the transition to formal thinking is supported best by designing and implementing projects (tasks or problems), within disciplines, which require active exploratory (mental or physical) manipulation on the part of the student (Asims & Henry, 1980; Sadler & Whimbey, 1979; Voyat, 1982). Projects are graded in difficulty level and in complexity--complexity refers in part to the degree of reliance on concrete referents in materials and solutions. And, projects require students to assume responsibility for their own learning. Instructional direction of projects is managed to encourage increasing independence of students in formulating solutions and in generalising solutions to similar problems or hypotheses. Contents of projects are structured so students are able to appreciate the conflict between facts, principles, or ideas within the task or problem as well as experience a need to work toward equilibrium or solution.

For students not yet at--or just beginning to arrive at--formal thinking, projects need to be tied more closely to concrete referents which fall within the students' experiences. For example, first ask students to solve a problem in science, e.g., problem using the principle of momentum, by asking for a solution step-by-step; ultimately, ask only for the final solution and require students to fill in appropriate intermediate steps. Or, develop understanding of metaphor in poetry by beginning with poetry actually written by children where language is concrete and obvious, and move toward poetry where language is more abstract (Petrun, 1980).

Mastern of the language of a discipline is necessary if a student is to become a formal thinker in that discipline. Language development, as well as cognitive development, is planned to occur as a result of project activities. For example, vocabulary of "social stratification" can be built using students' experiences as referents, within a project dealing with an analysis of solution strategies for neighborhood conflicts.

Projects are not "ready made." At the level of application they are unique to a discipline, an instructor, and a class of students. Flexibility is a key word in their application. However, projects can be tailored from pooled strategies.

Some reports on approaches by discipline to the development of formal thinking at the college level appear in the literature. The ADAPT Program is based on concrete exploration by students, applications beyond the classroom, and peer interaction. The program, which is implemented in six disciplines at the freshman level, begins with concrete and gradually moves toward more abstract formulations (Williams, 1978). Assessment of the program indicates that it creates a climate for exploration that positively influences student development along intellectual dimensions, and that students--by assuming responsibility for their learning--acquire new thinking skills in the disciplines and also experience a positive sense of accomplishment (Tomlinson-Keasey & Eisert, 1977).

In the DOORS Program, the major thinking skills needed for success in six courses at the freshman level are identified. Students work on the same thinking skills at the same time in the six subjects (Illinois Central College, 1979). Several reports describe strategies useful in specific disciplines. The strategies emphasize student activity and responsibility for learning, for example, in science (Butts, 1981; Dustin, 1981; Good et al., 1977; Killian, 1980), and in the language of the discipline, writing, and reading (Kurfiss, 1980; Wiener & Maimon, 1981).

While projects must be within the grasp of the learners, they cannot be successful if they are not challenging. As one researcher points out, the activities and materials incorporated into the traditional lecture or lecture/discussion format should be those which optimally challenge the present capacities of the learner--these are the types of experiences which are inherently motivating to the student (Kurfiss, 1980).

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COMMUNICATION APPREHENSION IN THE CONTEXT OF THE SEMINAR

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One of the great dangers of evaluating various items within the ecology of education is that for convenience we may devote our attention only to those aspects of the system which can yield some kind of quantified result which may seem to bestow a ritual reliability on the research. For example if we discover a high correlation between student's scores at the end of second level and their scores at the end of third level one of the most important inferences in some societies may be that third level education is as passive as second level and thus as useless as the second level in preparing people to cope optimally with the rapid developments in information and technology.

In this paper I am not calling for the abandonment of empirical reliability or for the abandonment of research into the differential performance of information channels (Allen 1967) within third level education; but if the third level is going to produce people who can adapt quickly and easily to the rapid pace of change in the new society, then at least as much attention will have to be paid to the structures which allow for creative intellectual development and confident emotional development, as is paid to the transference of information which can be too passive and non-personalized to serve the contemporary needs of third-level education if it is to play a dynamic role in today's society. There is no hard evidence which would indicate that the model of third level education simply as a training course for industry will be able to prepare people adequately for the striking pace of development which the world society is now experiencing.

In this paper I want to assess the seminar, one of the structures used traditionally in third-level education in many societies as the forum within which the student can personalize the information gained from the lecture and independent reading. Ideally, the seminar consists of the instructor and 10-15 students, with the instructor acting as the facilitator for student participation. The degree of real and independent participation depends on many things such as the structure of the seminar process itself, the level of challenge and curiosity afforded to the students (Malone 1981), the personality of the instructor and the personality of the students. In this study I want to look at the influence communication apprehension (CA), can have on the behaviour of students within seminars and their affective attitudes to participating in seminars.

Communication Apprehension is an area which has received considerable attention in America in the last twenty years (Phillips 1968; McCroskey 1982); there is also in America a research-awareness document known as I-CAN, a Communication Apprehension Newsletter (Watson 1982). While little or no attention has been paid to CA as such in most of the European Journals, there is a growing awareness of sibling constructs such as assertiveness (Furnham and Henderson 1981); social anxiety (Young and Martin 1981); the effects of stress and conflict "on both physiological and cognitive responses" (Smith and Principato 1982); and the slow but gradual development of social skills training and role play in the educational system (Halford & Foddy 1982).

One of the major writers on CA in America in a recent paper (McCroskey 1981:3), defines CA as "an individual's level of fear or anxiety associated with either real or anticipated communication with another person or persons". In 1973, a market research firm in the U.S. conducted a national poll to find out what caused the most fear or anxiety among people in general. Out of fourteen items offered for rank listing, speaking before a group was the factor chosen as causing the most anxiety. (Work 1982:268). While some social scientiest might have some methodological reservations about the method used by Bruskin Associates, few people would quarrel with Work's conclusion in his ERIC report that ". . .the Bruskin study strongly affirms that communication-related anxieties are widespread".

It is important however to distinguish CA from the benign state of heightened awareness, with its positive physiological and psychological effects, which is sometimes generated in the anticipation of communication. The latter can be a constructive force giving us more energy and a keener concentration of memory and intellectual powers.

In any description of CA, it is important to stress that the apprehension can occur not only in the actual communication process itself but also before the scheduled event. The apprehension generated by the prospect of communicating at a certain time may lead to total avoidance behaviour or may generate certain avoidance characteristics if the event cannot be avoided. A student in a seminar, for example, may never contribute anything voluntarily, or the absolute minimum if the response is directly elicited or cannot be avoided.

Research into CA has been divided into four situational contexts: public speaking, meetings, discussion groups and dyadic interactions (McCroskey 1981: 12). The seminar however, could be classified under each of the first three contexts depending on how the seminar is conducted. In various studies dealing with the causes of situational CA the following concepts are used: novelty, formality, subordinate status, conspicuousness, unfamiliarity, dissimilarity, degree of attention from others (Buss 1980), degree of evaluation and prior history (Daly and Hailey 1980). Little of interest has been said about the causes of communication apprehension from the point of view of apprehension as a trait model. It is assumed in this paper that an educational system - with its depersonalization, in the Schilder sense (Kraupl 1982), its formality, its evaluative process, and the never-ending institutionalization of the student's inferiority in status and knowledge - provides per se an environment which can create and maintain communication apprehension. This assumptive theory is not put forward as a theory in the strict logical sense but as an explanation which is not only acceptable in the light of experience but which also is predictive. The concept of CA itself is put forward here as a prototype concept which is essentially fuzzy and needing methodological definition wherever it is applied.

In defining CA for purposes of explanation, research or therapy we should of course make clear conceptually whether our definition is a cognitive or a behavioural construct, emphasizing the trait model or the situational interactional model (Shedletsky and Endler 1974:51; Richmond 1978). 'Anxiety' for example is generally regarded as a cognitive construct (Spielberger 1972), while 'reticence' concentrates on a particular effect of CA (Phillips 1968). While trait names can be helpful in understanding or explaining a concept, the 18,000 trait names discovered by Allport and Odbert in their psycholexical study of the dictionary in the '30s (Cantor et al. 1982:47), or the 2,000 terms for emotion discovered in Webster's Collegiate Dictionary and the Dictionary of Slang (Wallace 1970:112), should warn us that a trait approach may not be always helpful for purposes of accurate definition, therapy or research. I would not deny, for example, that CA may be closely linked with problems of identity but we should take warning that self-concepts and identity values are covert and difficult to describe (Mischel 1977), and that the isolation of the variables underlying assertive behaviour has met with only very limited success (Eisler et al. 1975). CA is at a complex crossroads between Linguistics, Social Psychology and Cognitive Psychology and we must keep in mind that we may never be fully aware on an individual student level, of the extent and depth of the communication apprehension for each individual student because an individual assessment could not be validly correlated.

While most of the research undertaken on CA has been in the U.S., "in the most extensive cross-cultural comparisons reported to date -- no significant differences" were found (McCroskey 1981:10), and in Zimbardo's work (1977) on a cognate construct, shyness, it is reported that there is no significant differences in levels of shyness between different peoples which could be specifically labeled culture-specific. Although I have found no research undertaken which studies the same context as I have done it is worth reviewing some of the research in America because it was undertaken in the context of education. CA levels increase substantially in the first years of education (McCroskey et al. 1981) and it can be reasonably assumed that this increase is linked with the child's introduction to the role relationships outside the affect environment of the family and friends. In a computerized study of talk-silence patterns it is reported, predictably, that high apprehensives talk less and less often than low apprehensives (Lustig 1980) and that shyness leads to the avoidance of oral participation (Friedman 1980). There was found to be a negative correlation between CA levels and students' attitudes towards school itself and to assessment (Hurt & Preiss 1978), but a positive relationship between teachers' rankings of apprehensives and student scores (Garrison and Garrison 1979). Research on oral examinations in Germany provided indirect support for the American findings where it was reported that "promptness and pace -- seem to be correlated with competence and quality (and that the) speech of speaking is also associated with the rating of intelligence" (Ingekamp and Wolf 1982:348).

Research in the area of CA originally concentrated on stage fright (Clevenger 1959), and later included singing apprehension (Andersen et al. 1978), writing apprehension (Daly and Miller 1975), and oral apprehension (McCroskey 1981). My study deals with apprehension in the context of oral behaviour only.

The research was carried out with second year students in the School of Communications at the NIHE, Dublin. A self-report measure specially created for this purpose, was used. This measure was chosen because it seemed to be the only measure which could yield results. Neither a physiological measure or a behavioural measure based on observation, would necessarily yield any significant results for a seminar setting and there would always remain the seemingly insuperable problem of variable linkage. Pre-research observation however had yielded the preliminary data that 85% of the sample did not participate regularly in a seminar unless directly elicited by name. The sample was a group of forty students of mixed sex in the second year of a degree course in Communications Studies.

The self-report measure was anonymous but included information on sex, social-class, and geographical background. It was expected that women would report higher levels of CA than men in keeping with the type of results reported about patterns of worry in the '60s and '70s (Simon & Ward 1982). But the results showed no significant correlations with sex, class or geographical background. A larger sample however, including students from many different departments in third level could yield results more in keeping with the reports on sex-differences in self-report measures of assertiveness in Britain and America (Furnham and Henderson 1981:227). It had been observed that the men of this group and similar groups participated in a public speaking forum significantly more often than the women (10:1).

The self-report measure used was a 22-item measure with 17 items related to communicating in the seminar setting, and 5 items to see if the apprehension was instructor-related. The 17 items deal with both affective attitudes and behaviour, with a balance of positively and negatively worded items. There is no empirical support for the reliability of the measure used and it is difficult to see whether fully reliable empirical tests could be established unless the measure concentrated more specifically on variable discrimination. An observational measure and a specifically designed self-report measure would also need to be used to check whether those who report high levels of anxiety evaluate their performance lower than neutral observers (Young & Martin 1981:205). It is believed however that the measure is carefully constructed and does have high-level general and surface validity in this context. It should also be remembered that the respondents have already acquired a considerable amount of information about communications and some experience in media practice and seminars which should yield a certain sophistication in self-appraisal. While the research is primarily designed to assess the levels of CA among this group of students the secondary purpose lying behind the research is one of consciousness raising in the belief that a "locus of control" must be established by the student because "normal social interactions do not significantly alter a person's perception of personal control" (Craig & Howie 1982:65); and that with the new self-awareness there will be a disposition to engage in self-directed and instructor-directed therapy be it of the SD, CT or SST variety (Halford & Foddy 1982; Hersen et al 1979), in the group or in the tutor-tutee setting.

Results: A. In the 5-item instructor-related section 25 was the score for a very high level of apprehension, 5 for a very low level or zero level of apprehension. The reports were as follows:

Number	Score
15	20+
20	15-20
3	10-15
2	5-10

The perceived relationship of communication apprehension with a particular instructor was much higher than expected with over 85% of the respondents reporting high-very high levels of apprehension which was instructor related. Ethical considerations made it impossible to pursue this particular variable to see if the CA was also discipline related because this would immediately identify individual instructors.

B. In the 17-item seminar related section, 85 was the score for a very high level of apprehension, 17 for a very low or zero level of apprehension. The reports were as follows:

Number	Score
8	65+
15	50-65
14	40-50
3	30-40

Again, the levels of apprehension were much higher than expected for students in a communications department with more than half reporting serious-very serious levels of oral communication apprehension in the seminar context.

Discussion: I would prefer to regard the results as an indication of a general problem rather than a precise measure of levels of apprehension. The research should be extended to cover other transactional contexts of oral behaviour to see whether the high levels of apprehension apply in other contexts or whether the seminar itself is the operative variable. Comparative research should be carried out in other types of departments and in other institutions to check the levels of oral apprehension. There is also some evidence but not conclusive, that lower levels of apprehension are reported for seminars which demand specific preparation than for very open type seminars. A more precise indication of seminar structure would probably be necessary in the development of the research. It would also be helpful to make distinctions between the types of 'information packages' developed in the seminars (e.g., factual versus conceptual information, skill versus creative development).

It should also be useful for a department or faculty to use such a self-report measure to determine the behaviour and the affective attitudes of first year students in the context of speaking in a public forum, writing, numeracy and using technology. If this study were done on a longitudinal basis additional evidence would be available to an institution for the monitoring of the various pedagogical structures used in the training of students.

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COMMUNICATION IN HIGHER EDUCATION: OBJECTIVES, RESPONSIBILITIES, AND SKILLS

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Research on post-secondary education in the United States has found that the first six weeks of attendance are a crucial time for a student's decision of whether to remain in college or university and that one of the most significant factors in determining the direction of this decision is whether the student has developed a close relationship with a faculty or staff member at the institution. (Beal and Noel) This "significant other" may be an advisor, counselor, or professor who quickly recognizes the student as an individual needing some attention, personal concern, and assistance and makes the effort to form this important attachment. I will use as the basis of this paper the relevant research in the field and the example of the Educational Advancement Program at the University of Tennessee, Knoxville, which has achieved an excellent record in its five years of existence in retaining and helping even high-risk students through its comprehensive program of innovative academic delivery and academic support services.

You may have the opportunity to become the "significant other" for students within your institution once you realize the need for this special, personalized relationship. Whatever your specific training and position may be, you will become in this situation a "counselor" to the student in need, so consider the objectives of this "counseling." The student needs to feel known within the academic community, identified with the school environment, and recognized as a whole person, not just a name on a class roll or number on a fee receipt. This relationship will, therefore, involve you as a whole person as well, which includes many responsibilities and benefits as you openly and creatively grow to know the student. This counseling is an educational process which helps students sort out their needs, problems, and goals and acquire interpersonal and communication skills necessary to their academic survival. We will consider what you, as the counselor, should learn, hear, know, do, understand, avoid, accomplish, change, teach, and encourage to make this process successful for the student.

All of our reality is composed of relationships, and success in achievements and a positive self-concept are largely dependent on good interrelationships with other people. Such relationships are fostered or hampered by experience, learning, and modeling, and a counselor-student relationship is one setting for such development. Your functions, tasks, duties, and aims as counselor involve careful listening, understanding, educating, facilitating, and often referring to other sources of help or information. Empathy, intelligence, concentration, training, confidence, and real care for and interest in the student will aid you in the performance of these complex tasks. Of course, many problems can arise which might hinder your assistance to students--lack of time, insufficient institutional resources, weak support from other members of the community, biases present within either yourself or the institution, to name but a few--but your goal and the goal of your student client is to progress around or through these toward personal satisfaction, academic success, continued growth, and happiness for the student who has sought out or happened upon your counsel. Your own abilities and sense of self, the student's motivation, institutional realities, and societal pressures will all influence the efficiency and effectiveness of your efforts. Though some of these factors are not within your control, a clear sense of your roles as counselor can help you optimize the benefits of a single or several sessions with a student in "knowing," personal communication.

Your primary goal is to provide service to students as an expert professional and then evaluate your performance, revise and improve it, and serve again. This is true for administrators, teachers, support staff--everyone responsible for the quality of higher education, and especially the counselor in direct contact with students. In the various aspects of your role as counselor you serve as educator, liaison, and facilitator, most effectively through a relational model which requires you to be holistic, humanistic, person-centered, and comprehensive in your attitude and approach. You can know about people through external observation, but you can only really know them and interrelate successfully with them if they trust you and choose to let themselves be known to you by revealing their needs, ideas, and total personalities. Through knowing students in this deeper way you can help educate them in how to live more effectively, how to communicate more clearly, and how to perceive themselves, others, and the world more accurately. These improvements must begin from where they are, what they know, and who they are already. Oral, written, formal, and informal communication skills are all necessary for coping in academia and beyond, and realistic perceptions of self and others within situations can provide students with great benefits in analysis and response. As a student counselor you will also find yourself in a position to educate your peers about the efficacy of the "significant other" relationship by sharing ideas, methods, practices, and experiences with them, while also encouraging and motivating them to create and develop their own opportunities for such interaction. You may also be able to educate faculty in how to teach individuals through a recognition of different student backgrounds, learning styles, and needs, rather than tossing information to an unknown group, unconcerned about the learning which is or is not taking place. Since a professor in a large class may not have the time or ability to be individualistic to the extent which would help many of the students, individual or small group sessions with tutors or teaching assistants can supplement the classroom, perhaps at your suggestion, and other technological learning aids can be employed within the context of these personal relationships and help. Computers should never be used to replace human concern and involvement, for they cannot provide the same identification and motivation.

Since assistance to students is effective largely to the extent it is comprehensive and based in many sources, you may also be able to educate the academic and larger community to the importance of support services and supportive attitudes in retaining students and giving them the opportunity for academic success and advancement. This is certainly cost-effective in diminishing further recruiting expenses for the university or college and in developing and utilizing the broadest possible range of human resources and potential. You can use your knowledge and experience of working with students to educate administrators to the needs of students and the benefits of student-centered academic programs. The leadership of administrators can be a strong and assertive force for more humanistic management within the institution and for innovative support services to help students learn and feel recognized rather than thingified. Your counseling will also teach you about the learning process, ways of improving your relationships and your institution, and the value of openness to others and experiences. As a true educator, you will also be educating yourself.

The liaison function of your counselor role requires that you take the responsibility to research other available sources of help for students and new areas which need to be explored and opened for greater service to students. Think in terms of a systems approach to find and more completely analyze the numerous networks and interactions which comprise academia. You may be a liaison among students to promote their understanding that they are not alone and share common goals. You may link students with services in and beyond the university and enhance their knowledge of resources and also connect these services so that they may more readily promote their clients' needs and share resources. And you may help faculty and administrators interact for the benefits of staff members and students in need of support, realizing their equality in service to students.

As a facilitator you will need to be active, energetic, and eclectic, using all of your talents, ideas, and resources to see the total picture and work with the student and the institution in all areas which are in need of change. New students tend to feel frightened, young, and naive, but you can help them overcome the culture shock of their environment by helping them understand the *gestalt* of the academic setting and themselves, emphasizing their strengths and capabilities, as whole persons within it. You can encourage and demonstrate major survival skills, helping students to learn by doing such things as time management and letting them model their behaviors from yours and those of other successful individuals and cooperate with you in creating models by which to structure their own habits and patterns within their new milieu. In making yourself known to them and introducing them to others, you can provide them with rich resources. You may also broaden your own contacts by searching out others on the campus who wish to facilitate student learning and progress. As you and your students learn of all the sources of services, you will be able to refer students where they can best be served, and you may also facilitate the improvement of these service facilities and help eliminate costly overlaps in services in favor of providing for those needs not filled. You will show your faith and trust in students and the school by your involvement and activity, and you will help them recognize and utilize to their advantage the complex web of internal and external responsibilities and controls affecting their actions. You can motivate them in their studies by helping them see the relation of their efforts to their own needs and goals, for they must see a purpose to their work or they cannot pursue it for long. Recommendations from and discussions with you and others play a part in their consideration of factors affecting their choice of field and level of educational attainment--money, time requirements, quality of life, what people in the field do, limitations vs. open doors for the future, responsibilities to themselves and to others (students, employers, society), and the breadth of experiences and realities which will influence their later years. They need guidance and practice in clarifying, being logical and objective, and organizing their communication and action. You can facilitate student assertiveness, confidence, and clear expression in the areas of affect, content, ideas, and exemplify all aspects and methods of communication in your relationship with them (sharing, motivating, convincing, teaching, learning, listening, defusing, infusing, arguing, explicating, and others). You are an advisor, advocate, catalyst, channel, confidant, model, motivator, and teacher in this single setting. Now we will consider your communication responsibilities within these complex and interrelated roles.

You must be fully present in the counseling relationship, calling on your entire range of personality and human skills, guided by your philosophy of how best to help students, in order to respond quickly and appropriately and be effective overall in meeting the student's needs from moment to moment. Studying some personality models might help with this facility and fluency, as will the following guidelines for structuring a counseling session. You can set the tone of the session in the wholistic, accepting, empathetic, confidential, and person-centered attitude you project. By being aware, observing, and constantly ready to revise your perceptions, you can create a situation in which planning can occur--open yet efficient. You are really working with the students, not merely convincing or influencing them to a decision you have already made about what is best for them to do. You are not responsible for prescribing some ready-made "cure" but for cooperating with them to reach the best decisions. If you can write down your conclusions before you meet them, you are not giving yourself a chance to know them. You can make use of any informal contacts with students to support, enhance, and encourage trust and communication. Listening to them demonstrates respect, a necessity in communicating with anyone. Be sure you understand the student's language, symbols, and meaning, not jumping to unwarranted assumptions. How can you be sure you have it right? Recording or taking notes will not resolve misunderstandings. You must respond to the student, being aware, examining, and considering alternatives. Some questions can be beneficial in this process, but do not bombard the student with them. Ask a question only if it will help the student (see Benjamin, pp. 65-71, for examples). Try questions which are open and indirect, avoiding threatening "why?"'s or questions which are closed, double, or include the answer you want. Do not avoid or overdo the answering of the student's questions, but try to respond helpfully and with understanding to both asked and implied or unasked questions, including the assurance of the confidentiality of the conversation, to put the student at ease.

Know your own values, avoid imposing them on the student, and discard your defenses to encourage him or her to be less defensive in talking with you. Do not rely on your authority, on test results, or on judging, for these can cause you to lose sight of the person you are trying to help and the relationship between you. Be aware of what you are communicating beyond the content of your words. The amount you talk--too much or too little--can imply lack of interest in the student through focusing the attention on yourself or letting your mind wander from what s/he is revealing. Avoid interrupting the students, but pay attention to their interruptions of you, as these may signal a message of special importance and urgency. Make sure that you respond to what the student has really expressed and not to your own opinion of what he should have expressed. Keep responses relevant to student needs rather than your own, a help rather than a hindrance to the flow of the conversation. Explore all directions, facets, and forces in the concerns students communicate to you. Be open and focus on understanding them and providing the information and assistance they need at every point. (Benjamin)

Many student counseling relationships are formed to facilitate decision making, problem solving, and goal setting. To avoid discomfort, guessing, and pretending and to focus on the purpose of the counseling with trust and ease, share in advance your intentions and the meaning of what you do. This will eliminate mystery, create greater self-confidence in the student, and allow you to guide the discussion and keep it on topic. Utilize your leadership while promoting responsibility of students for their own decisions by helping them at each step to summarize progress, draw conclusions, and move on smoothly to the next step. A wide repertoire of leads and responses may be appropriate, depending on the specific situation. At the student-centered end of the continuum are such responses as silence, "mm-hm," restatement, clarification, reflection of feeling, all of which encourage further expression by the student and demonstrate concentration and understanding by the counselor. Involving more of the counselor's perspective and lead are interpretation and explanation (which may be an orientation to the situation, explanation of behavior, explanation of causes, or an explanation of the counselor's position). Encouragement, assurance-reassurance, suggestion, advice, urging, and moralizing (which should usually be avoided) are counselor-centered responses and leads. In such responses as agreement-disagreement, approval-disapproval, opposition and criticism, disbelief, ridicule, contradiction, and denial and rejection the counselor acts as an authority figure to sanction or challenge and change the student's opinions and actions. And finally in scolding, threatening, commanding, and punishing, the counselor openly displays his authority, against the wishes or tendencies of the student. These are generally viewed as a last resort and may be more harmful than helpful to the relationship established and developing. Humor can help, relax, and enhance rapport when it is natural, spontaneous, and mutually shared and enjoyed. (See Benjamin, Chapter 7, for further description, discussion, and response examples.)

As a mentor in helping students learn how to work through an academic organization, you are fostering their clarification and specification of directions, and you are also accumulating reasons to change and improve the institution. On every level the communication process is a source of learning, sharing, growth, and the key to human relatedness. To make decisions or solve problems an individual or group must clarify goals and objectives, interpret data and alternatives, explain and examine possible outcomes, obtain additional information, and organize material and priorities. Evaluation then considers the achievement of desired aims and future needs and the impact on the interpersonal relationships involved. An awareness of the components of communication can make a person or an organization more effective in its communication responsibilities. The act of communication is initiated to perform some function, to achieve a goal or objective. The Sender decides on the purpose and content of the communication, selecting available symbols which might convey his thoughts (written, oral, pictorial, nonverbal) and choosing what he wishes to reveal and conceal to his audience. He holds many expectations about what modes of delivery will be effective and understood and what he hopes the outcome of the communication will be. The Message conveyed is a symbol of an idea, event, information, or attitude. A more complex message permits more complicated meanings to be expressed and interpretations to be made. The Medium selected for transmission (oral, written, or whatever) may be more or less direct, more or less informal or formal. It is affected by the status of the people involved, by their relation to each other, and multiple media may be chosen to present one message. Different people learn better in different ways, and most people tend to receive much more of their information from body language and the tone of the presentation than from the words spoken or written. The Receiver will try to interpret and understand the message sent and will have his own feelings and reaction to the subject. The physical structure of the situation will affect the receiver's ability to "hear" the message and also his response to it. The Effect of the communication, its final component, serves as a test for whether the message has been understood and had the desired or intended impact. The sender, and perhaps the receiver as well, can then evaluate the success of the communication process and move on to the further communication or action which they deem appropriate. The process may then be repeated, but it helps the accuracy if the participants engage in some form of evaluation at this step along the way. (Ausubel, Egan, Ericksen, Gagne, Hill, McCarthy, Scheidel, Watzlawick/Beavin/Jackson)

Of course such a complex process opens opportunities for many difficulties to arise. Symbols may not be commonly understood, and the sender and receiver may not share the same interpretation of the context. Use of power words may cause distortion or "noise" in the communication. Different Values may cloud the central issue, with the participants' assumptions, intolerances, and world views interfering with the information exchanged. In a group an emphasis on conformity and majority vote rather than true consensus can restrict enlightening points of view and cause members holding alternative ideas to feel alienated. Differing Perceptions of the problem at hand, of the physical setting, of nonverbal cues, and of oneself and others may also lead to static in the communication channels, so communicators are wise to ascertain the degree of consistency and work to narrow serious gaps. The relative Status of the sender and receiver affects the quality of their communication efforts as well. Authority tends to squelch and equality to promote sharing. Attitudes of superiority and inferiority interfere with communication and tend to reduce it to "conversion" efforts. Negative Emotions are frequently ignored by counselors, apparently in the hope they will disappear, but they may be symptoms of vested or conflicting interests, fear, insecurity, anger, or defensiveness, all of which may prevent genuine communication. Role Definitions within a communication relationship should be cooperative and consistent with the purpose of the relationship and the specific communication, but too often roles such as dictator, threatening judge, opponent, passive observer, or "salesman" block the potential for real communication. Silence within a sequence of communication may not be bad, but it should stimulate investigation of what is not being said, getting beneath the presented defenses to the real problem. A counselor can only deal with silence effectively if he is not preoccupied with his own role but attentive to the student. The helper must also manage Conflict when it arises, determining what the real issues are by analyzing the emotions, values, obstacles, and behaviors presented and the cost of these to the student and the relationship. Confrontation can be used to move the student toward change if employed with care and not misused. The counselor's sharing, observing, helping, orienting, and leading finally must be evaluated according to their effectiveness. Both personal performance and the entire setting may be examined for necessary changes. The student can practice newly learned behaviors, such as assertiveness, clear expression, organization of ideas, through role playing, for such skills can then apply in all settings, from educational to personal, social, and administrative/managerial. Beware of overgeneralizing on the part of the student or yourself, since remaining aware, critical, flexible, and logical is the best course for recognizing and overcoming difficulties. (DiCaprio, Egan, Rogers, Scheidel, Watzlawick/Beavin/Jackson, Wing-Sue)

Your role as helper may prove to be a turning point in a student's education.

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TEACHING UNIVERSITY GRADUATES TO USE THE MICROCOMPUTER TO PRESENT PROGRAMMED INSTRUCTION

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We have devised at our university a novel course for those interested in learning how to use a microcomputer for teaching subjects other than mathematics and computer science. Students come to us who want to write lessons in biology, history, language, and so forth, lessons for use in the last years of school and first years of university. They have little prior knowledge of the computer, or of the technique of programmed instruction. After seven months they emerge as competent computer lesson writers with a small library of thoroughly tested, working lessons stored on diskettes. In this paper we explain the idea behind the course, what the course involves, what it means to those who take it, and where this sort of technology may be leading us, both in terms of practical applications and in terms of laboratory research into new kinds of teaching machine appropriate to serious university work.

The course aims to strike a balance between two different skills: using a computer language to write instructional sequences economically on the one hand, and using the nineteen-sixties ideas and methods for adaptive teaching machine lesson writing on the other. It is not widely appreciated that the programmed learning has techniques, and very good ones, which were developed for the primitive first-generation machines like the Autotutor and Grundytutor, machines which back-projected pages of text from 35mm film driven by gear and sprocket to the desired frame. Being a teaching machine lesson writer in those days was very exciting, there was a sense of exploring a new frontier; after a day's work we would congregate in the local pub to discuss RUs and EGs, remedial loops, and other innovations, with an enthusiasm surprising considering the very hard work involved, and the dim prospects. Out of it all came a body of real knowledge about how to present information didactically yet tantalisingly, giving the student pause for thought at precise moments thought out beforehand. We learned to ask mind-bending questions of the student, to analyse and break down subject matter with a thoroughness which was new then and probably has not been bettered since, systematically speaking. We tested every teaching point on members of the specified target population, and revised our lessons with care, for our behavioural objectives were truly things people did, not the vague objectives of so many institutional curricula.

Now it is true that some of the pioneer work of the sixties centred on the limitations of the machinery; the Grundytutor could cope with multiple-choice questions only, and of course they had to be listed, and the list could not exceed the number of buttons the student had before her, buttons A to J, that sort of thing. Susan Markle wrote whole chapters about prompt techniques[1] and the various kinds of blank ('How many ____ in the _____ make up a _____?' was a Swiss cheese, one of several crimes the lesson writer might perpetrate) because the machines demanded blank-filling and prompting, so we had to cope with these things. But while the microcomputer has relieved us of the responsibility of worrying about such trivia (PILOT simply searches the student's answer for keywords) much remains in Markle's writing, and in the writing of Crowder[2] (hard to come by), Pask[3], and to a certain extent Skinner[4], which is still valuable and probably will remain valuable to the careful lesson writer. The very concept of a teaching 'frame' is undeniably useful, as is the classification of frames according to their purposes and flow-chart positions; the patient no-nonsense tone used to speak to the student is something a writer must still strive for in addition to the ordinary goals of clarity, accuracy and brevity. And there are a multitude of hard-won practical skills to be mastered which are also a legacy of the sixties: knowing how to relate examples and responses to the purpose of the frame, knowing how a remedial frame must differ from a main sequence one, knowing how to gauge the largest possible step you can expect your student to take without falling into confusion. Of course this amounts to being good at formal teaching within a framework, so it helps to be of a logical turn of mind. Training in logic has been much neglected in schools on both sides of the Atlantic (ask yourself how many kinds of logic you can name, or sit down and try to list the 14 propositions of binary logic!) but the flood of microcomputers into homes and institutions is putting this right very fast indeed. In order to write even the simplest game program one must think clearly in logical steps, line by line, and as soon as you run your program the microcomputer gives you feedback, it is in many ways a machine for teaching logic, the common everyday yes-or-no logic essential to intellectual conversation and intelligent planning.

The course balances the writing of instructional sequences against the devising of computer programs to present those sequences to the students. In signing up for the course, most of the members of the class thought this latter component to be the whole of what they had to learn, they did not realise that learning a computer language, even one designed for teaching by computer, is merely to give oneself a tool; there is nothing in a computer language, even one as didactic as PASCAL, which tells you what to do with it. The instruction books give only fantastic, silly teaching sequences by way of example, in all the various manuals we looked at we could not find a single well-written teaching frame. Presumably the programmers who wrote the manuals did not know of the excellent programmed lessons which do exist and can be found in libraries, for example the classic teaching program by Patrick Thornhill The Waterloo Campaign[5] which puts the student in Napoleon's boots at the height of the battle and asks him what tactical decision should be made next. Perhaps the manual-makers are too interested in the intricacies of the language they are explaining to bother about what people do with it.

Learning how to program a microcomputer to present lesson materials is a great deal of fun, particularly for those new to computers for whom the jargon of the programmer opens up a fascinating new world, rich in puns and double entendre, 'pushing' and 'popping' ideas from one level of a logical-typing-hierarchy to another, a truly Alice-in-Wonderland world where a bedside copy of Dodgson's *Symbolic Logic* is as essential as spending an hour or two with the first volume of the *Principia Mathematica* reading Russell and Whitehead's essay on the vicious circle principle and the infinite regress of paradox.[7] Yet it is also hard work and requires many hours sitting at the keyboard of an Apple with a PILOT Author diskette in one disc drive and a lesson diskette in the other, thumbing through reference books to discover why putting a graphic into a teaching frame has mysteriously closed the file for keeping a record of student responses and frame names: *Aha! The GX: automatically closes the currently open file, and of course PILOT keeps only one file open, so that's it, I'll put a FIX: in right after the graphic and try running the lesson*. (Whir and clatter of disc drive talk.) *Got it! Now does the sound effect do the same thing? Back to the book*. The reward for these hours of labour is in the end an easy mastery of the editing techniques, a familiarity with the procedures which present information fast and efficiently, and a confidence in (rather than a fear of) the microcomputer as an instructional device.

Many of those who complete the course seem to develop confidence in the science of education also, which is surprising. Critics such as Jacques Barzun[8] have long dismissed even the possibility of such a science, and the close association of education with the demisciences of psychology and psychiatry does nothing for its reputation, not to mention all the unreadable, one might say alchemical, tomes which line the education shelves of most university libraries. Nonetheless our students see a real science showing the tips of its ears, a science of education rooted firmly in laboratory work, neurophysiology and logically organized teaching machinery; and some of them find this a relief, even a challenge, and find themselves looking forward to developments in this field in the near future.

What does the future hold? In practical terms, we can look forward to third generation machines based on Pask's equations for conversation, and perhaps the machines will be able to talk to us, which will make it a real conversation, providing the old-fashioned return key is dispensed with. Already an anachronism, the 'press RETURN at the end of the frame' drill does little to aid learning, and seems to us to prevent it on occasion. Imagine having a tutorial with a don who would never answer until you pressed his belly button. Actually this is a game which does amuse four-year-olds, especially if the daddy whose belly-button is being pushed makes a sort of honking noise, but surely at the high school and university level we can do without so elementary a ploy?

Meanwhile, on the theoretical and still very impractical level, our own laboratory work is leading us into new territory. We are developing prototype keyboards which read your mind (don't laugh, it's true!) and which are played sensitively like a musical instrument, while the computer builds up an electronic mirror image of the behaviour of the student with whom it is conversing, and uses this inner model as a guide in planning teaching strategies and tactics. Napoleon would have been delighted with such a toy, no doubt. Let us pray no latter day Napoleon lays hands on it.

NOTES

1. Markle, S. Good Frames and Bad. Wiley, 1964. It is a shame that this book is out of print, for we think it one of the best guides to writing good teaching frames. Among many useful appendices is summary of the Evans-Glaser-Homme RULEG system.
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5. Skinner, B.F. The Science of Learning and the Art of Teaching. Harvard Educational Review 24, 2, 1954.
6. Thornhill, P. The Waterloo Campaign. Methuen. 1965.
7. Russell B. and Whitehead. Principia Mathematica. Cambridge. 1910.
8. Barzun J. The House of Intellect. Mercury. 1960. The fifth chapter deals with the university. The criticism is cutting, the footnotes are hilarious.

TO EXPAND ON-CAMPUS COMPUTER INSTRUCTION ACROSS THE CURRICULUM, ENCOURAGE HOME COMPUTERS--A CASE STUDY OF A LIBERAL ARTS COLLEGE

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Introduction -- The faculty and administrators, yes, and many of the students at most colleges and universities believe today that computers need to become a more pervasive campus tool in all academic areas. Most faculty and administrators believe that they need to encourage and foster computer literacy among their students. Many are considering some sort of computer literacy standard as a graduation requirement. Some few have already made that step. Yet in spite of this broad philosophical consensus toward greater use of the computer and generalized support of computer literacy, many faculty and administrators at colleges and universities believe there are major obstacles in achieving this goal.

As Gordon Bowden has pointed out, "The computer has been viewed as a threat to the teacher's role, as an impersonal input mechanism that excludes the two-way, person-to-person relationship regarded as vital to education." (Educational Record, Fall 1982, p. 8.) The computer, as previous technological teaching aids such as tape recordings or movie projectors, is viewed by many educators with attitudes of indifference or skepticism if not opposition. (Bowden, p. 8.) In spite of this attitude most campuses now own several computers, although usually only a small percentage of the faculty use them.

A recent new development, the inexpensive cost of many microcomputers, is now helping curiosity to nibble away at these old fears. Here and there professors are buying home computers and a quiet revolution may be underway.

Another factor on the national scene, having a growing impact on faculty attitudes, is the changing interests of students toward more practical programs, with more career focus, rather than a broad liberal arts education. There is also the reality of a declining number of students interested in any type of higher education. In the United States that decline is more significant demographically than it is in other developed countries because of the greater access to higher education in the United States. Finally, in the United States, with the advent of microcomputers and computer games capable of being hooked up to one's television set, the next generation of college students will be very "computer comfortable." Their expectations will be high and their fears will be minimal. There is likely to be only a few years for faculties to respond to this competency change of entering students.

A Brief Profile of Marietta College -- Marietta College is a small coeducational non-sectarian liberal arts college with a number of career supportive programs. Located at the junction of the Ohio and Muskingum Rivers in Marietta, Ohio, a town of 16,000, in that part of southeastern Ohio that lies in the Appalachian region. The Ohio River Valley, north and south of Marietta, is an industrial valley with many chemical and metals firms. Branch plants of approximately 25 of the Fortune 500 companies are located there. Marietta College has an enrollment of 1250 students, drawn predominantly from the northeast, a faculty of 95 with a consequent faculty-student ratio of 13:1. Historically known for the strength of its science programs, it also has a petroleum engineering program as well as strength in management and accounting, along with the traditional liberal arts departments. The college is a teaching institution. It has had a Phi Beta Kappa chapter since 1860.

The College, like many similar liberal arts colleges, is characterized by strong departmental autonomy and is an institution with steady state enrollment, in a community that is relatively isolated from other colleges and universities and from large metropolitan areas. Seventy percent of the faculty are tenured, indicating significant faculty continuity, with average age in the forties. Students are predominantly white, upper middle-class, traditional, with a slightly more conservative bent than the national norms indicate.

Several years ago, as part of the College's long range planning, student selectivity was significantly increased so that a quality reputation for the college would be assured during the period of decline in 18-year olds that demographic patterns foretold. The college, consequently, is a competitive college.

Because the faculty is generally of long service and there are relatively few new entrants into the faculty due to the steady state enrollment, faculty development is an important activity on the campus. In fact the college currently enjoys a sizable faculty development foundation grant which encourages faculty to expand their breadth of knowledge and experience by examining bridges or linkages between the academy and industry, between the academy and public schools, between science, technology and humanities, and between liberal arts and careers. Faculty are encouraged to engage in risk taking, with the risk being minimized by the support from the foundation grant.

It is out of this special faculty development activity that significant faculty interest in computer literacy and computer usage has developed. This interest was initially stimulated by the "traditional users of computers;" that is, mathematics departments, computer science people, engineering departments, business departments and physics and chemistry departments.

The first motivating activity was a series of computer workshops which were open to faculty and administration. These workshops consisted of a series of lectures and then 5 hours of individual one-on-one instruction on our computer. More than 50 of the faculty participated in these workshops. As the workshops continued various faculty members from many departments were stimulated by this computer experience and sought more involvement. These workshops were held just as many of the new microcomputers were becoming available at very low prices. A number of faculty, both the traditional users and those motivated by the workshops, purchased their own personal computers. Users groups focused around an individual computer brand sprung up. The excitement and enthusiasm generated by the faculty involved in this program (more than half of them) motivated the president to capitalize on this atmosphere and to seek a foundation grant which would provide a 50 percent personal subsidy for faculty buying new microcomputers or for those who already owned one to buy additional hardware or software.

It quickly became evident on campus that if a faculty member were to have his own personal computer at home he could experiment with it, interact with it, try things and fail, try things and succeed, but basically have an opportunity to become at ease with his own personal microcomputer at home, discovering that it is a teaching aid rather than a threat to his role as a teacher. The new atmosphere grew on campus. The faculty began to see, as Stephen White of the Sloan Foundation stated, "The computer....provides a scope for analytical skills that has never before existed and in so doing it has altered the world in which the student (and faculty) will live as well as the manner in which he will think about the world. It is these basic facts that constitute the link between the computer and a liberal education." (The New Liberal Arts, a Sloan Foundation occasional paper, 1982, p. 5.)

Encouraging Home Computers - Some Useful Preconditions -- Five factors or preconditions exist, some recently developed, on the Marietta College campus. These preconditions are campus culture, confidence/trust, curricular flexibility, competition, and a supportive administration. This case study suggests that most of these preconditions at Marietta College could be fostered and transferrable to other institutions.

1. Campus culture -- There exists on the Marietta College campus among the faculty encouragement for breadth. Every term between ten and twenty percent of the faculty take courses from one another. Biologists studying accounting, chemists studying philosophy or French, mathematicians taking geology, philosophers studying astronomy--there is a respect for learning and a curiosity about ideas. We are, in a sense, "academic voyuers," looking over the back fences of other peoples' disciplines.

There is the normal support system to help a person renew in his or her speciality through sabbaticals and summer grants, so that there is a balance between those seeking breadth and those seeking specialization; in fact, the same lively faculty members are often doing different things at different times. Part of this atmosphere is enhanced by individual faculty members giving workshops and short courses for their colleagues. Lately these have been in computer literacy and in communications. Many faculty are taking communications workshops so that they can integrate student writing and speaking assignments into their courses whether it be chemistry or drama or economics or art. Ours is a campus culture which recognizes and appreciates good teaching, good advising and well constructed courses.

2. Confidence/Trust -- Faculty development at Marietta College is truly development-oriented and is not used as a subtle form of evaluation by the administration. A faculty development committee sets policies and makes recommendations to the dean in terms of faculty development grant allocations. The faculty have confidence that developmental activities are encouraged, consequently they are willing to take risks. They receive professional and personal rewards for successful risks--they know they have the right to fail or the right to disregard a possible program even if their risk taking succeeds. They are confident of the support from their colleagues in their varied developmental activities.

3. Curriculum -- Marietta College curriculum is a balance between general/liberal education requirements for all students and departmental autonomy in determing requirements in the major. Most majors require cognate work in various fields so that departments not only serve their students but serve each other. An important element in the curriculum is the existence of experimental courses. In effect, Marietta College has a small "experimental college" operating within the curriculum. Individual faculty members may announce that they are offering an experimental course which may be taught once without having to go through the regular pattern of course approval by the educational policies committee. The experimental course may be a totally new course or it may be a course in the curriculum that is going to be taught in a very different way--for example, is going to be taught with considerable computer activity built into it.

Marietta College's curriculum provides both for liberal arts and career programs. Consequently most departments have not only theoretical and historical courses but applied courses as well. Within this framework there is strong emphasis on communication ability. Students, in addition to their composition and public speaking graduation requirements, are required to take three additional courses that are certified to enhance communicating skills. A faculty committee must certify that courses meet the communications standard. Now faculty members with home microcomputers have discovered that word processing and text editing can be woven into their communications courses and new support for computer use has materialized.

4. Competition -- A healthy dose of competitive pressures from the external marketplace has made the faculty aware that there are fewer good students out there to recruit and that over the next decade these numbers will be smaller. At the time of this decline in the number of 18-year olds, there has also been a shift in student interest to career or other applied programs, with computer science being either a specific interest or a recognized tool. Our faculty, aware of this, have become involved now in helping to attract students and one way of attracting good students in the future will be to have a computer literate faculty with computer-friendly courses.

Internal competition has also proved to be a boon in promoting faculty acquisition of personal computers at home. As a group of faculty settle on a specific computer brand, such as a Commodore or an Apple, supportive user groups spring up around that particular brand so that software can be interchanged; individual programs can be traded; floppy discs can be exchanged, etc. As these user groups develop, each seems to spawn a quasi-zealot who actively promotes the efficacy of his or her favorite brand. Not only will more people who own the same brand of computer provide a potential for greater software availability, there is a competitive brand pride that develops as well. A threshold number of home computers probably needs to be acquired by the faculty but once that threshold is crossed the internal competition from the brand zealots becomes a powerful force. User groups also pull in people from the community who own the particular microcomputer brand, so faculty involvement in the community is also expanded.

5. A supportive administration -- Because there are so many brands of personal microcomputers on the market, a college needs to develop a "approved buy list" so that faculty will be encouraged to buy from a particular list. This is needed so a college can get maximum advantage from personal home computers by establish-

ing campus computer work stations for each of the popular brands so that faculty may bring their tapes or discs, etc., to the campus for maximum convenience. The college should supply the microcomputer, printers, etc., at these work stations.

The dean and president must be highly supportive of faculty acquiring personal home computers. At Marietta College the dean has been especially active in establishing the concept of experimental courses for our "experimental college." As president, I have, in earlier parts of my career, had a background of developing applied programs and interdisciplinary programs at universities in developing countries to create the kind of atmosphere and encouragement for risk taking and the right to fail that is one of the important preconditions of the program at Marietta College. The president must also be willing to commit resources.

A subsidy incentive as a solution -- The computer training component of the faculty development program (involving more than half of the faculty, many with virtually no previous experience with computers) was received with an enthusiasm beyond our expectations. As a result of this activity approximately a dozen of our faculty were motivated to purchase their own personal computer for home use. These included a music professor, a psychology professor, an education professor, biologist, mathematician, management professor, among others. As president it was evident that this enthusiasm was an unusual and precious development. I suggested that we apply to a foundation for a grant to subsidize the purchase of home computers by the faculty. The subsidy was to be modest; it would be 50 percent of any expenditure of a faculty member up to $400. The expenditures above that amount would receive the maximum $200 subsidy. Faculty who already owned personal computers could have the same kind of incentive matching grant for the purchase of new software or additional hardware items such as a printer, etc. In presenting the proposal to the foundation, I told them that I hoped they would fund it because of the enthusiasm on campus, but I was candid and said if they were unable to fund it I would find the money somewhere, because I wanted to encourage many more people to buy home computers. The proposal was submitted in late September. In early December we were notified that it was not to be funded.

In mid-December I sent a memo to all faculty indicating that although the foundation had not funded our request the president's contingency fund would at least provide a $100 subsidy. By then an additional 15 faculty had acquired personal home computers or had them on order. The local newspaper reported the story that Santa Claus had come early to the faculty at Marietta College with the announcement of the subsidy program.

Early in January we received a pleasant surprise. The foundation notified us that additional funds had become available at the end of the year and our program would be funded after all. Since then another ten faculty have ordered home computers. A new round of computer workshops are in the making, new user groups are developing and tentative first relationships between competing user groups are beginning to open up.

Summary. The Marietta College faculty are rapidly becoming computer literate. Dialogue at the faculty tables in the campus snack bar is about new computer components that people are putting into their courses. Anecdotes are exchanged about stupid mistakes that they made at home on their computers--demonstrating that our confidence level has grown and we are comfortable in sharing our failures as well as our successes. The mystery has gone out of the computer; it is seen as a tool and not a threat. Faculty committees are discussing just what the nature of the computer literacy graduation requirement should be. It is no longer a question of whether we should have such a requirement, it is now a discussion of when and in what form. In addition to faculty, librarians, psychological counselors, the college editor, admissions office, financial aid, registrar--people in all of these offices have acquired personal home computers.

Some campuses are now requiring all students to own a microcomputer, even though many of their faculty may not be computer comfortable. Our experience suggests that getting the faculty excited, involved, and confident may be a better way to proceed

A computer revolution has come to Marietta College. It came about through grassroot faculty activity, i.e. workshops, personal support and interest generated by a series of important preconditions. It was enhanced by the explosion of technological change in the computer industry that brought personal microcomputers within the price range of each faculty member.

The quiet revolution has been an exciting one. It is already evident that Marietta College will never again be quite the same as it was before faculty were able to have computers in the privacy of their homes enabling them to try out their ideas, overcome their fears and begin to recognize that as Stephen White has said, "The computer is beginning to do for the mind of man what the engine did for the muscle of man."

If an opportunity comes along for your campus to subsidize personal computer purchases of your faculty, grab a hold of it and then hang on. It will be an exhilarating ride.

BEYOND COMPUTER LITERACY: THE DESIGN OF MICROCOMPUTER EDUCATION PROGRAMS FOR TEACHERS

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The marked increase in microcomputer availability in the public schools across the United States has created a need for colleges and universities to address computer education in the preparation and continued education of teachers. In the recent past, the microcomputers were used predominately in mathematics programs, thus, if an elementary or secondary teacher was found with computer skills, it was likely to be in mathematics or, to a lesser extent, in business education.

Data on the extent of computer use in schools changes daily; the tables below, however, are projections developed from a survey in April, 1982, of 900 public schools conducted by a private contractor for the National Center for Education Statistics. Released in August, 1982, the survey found that the number of personal computers used in schools for instructional purposes tripled between the fall of 1980 and the spring of 1982.[1]

The Number of Computers in U.S. Schools

Grade Level		All Uses			Instructional Uses	
	Total	Number of Micros	Number of Terminals	Total	Number of Micros	Number of Terminals
Total	132,459	101,987	30,472	120,908	96,462	24,446
			(in percents)			
Elementary	21	24	13	22	24	13
Secondary	75	72	83	74	72	82
Combined and Other	4	4	5	4	4	5

NOTE: Percents may not add to 100 because of rounding.

Uses of computers in school vary: in addition to central administrative tasks like payroll, scheduling and maintaining attendance records, computers are facing increased use by teachers for classroom administrative tasks like keeping grades (see "Gradebook," a software package for the TRS 80). Of primary interest in terms of teacher education, however, is the instructional uses of computers in the classroom. The numbers of schools involved in computerized instruction are summarized below.

Public Schools with Computers Available for Instruction in 1981-82

Grade Level	Total Number of Schools	Number of Schools With Micros	Number of Schools With Terminals	Number of Schools With Computers
Total	81,970	27,501	5,898	29,028
		(In percents of column 1)		
Total	81,970	34	7	35
Elementary	50,800	22	2	22
Secondary	25,297	60	18	64
Combined and Other	5,874	20	6	24

Within the broad area of instruction, use of computers varies significantly. In computer-assisted instruction or CAI, the computer is the medium of instruction. General formats of CAI include drill and practice, tutorials, demonstrations, simulations and games. Common game types include skill and action games which facilitate eye-hand coordination, adventure games which teach logic, fantasy games, and strategy games like chess and backgammon. Computers are also the object of instruction in a growing number of schools: thus programming is taught. BASIC, LOGO, and, increasing, PASCAL, are taught in high school computer classes (PASCAL is the language on which students are to be tested by the College Board).

The following table summarizes the major instructional uses of microcomputers during the 1981-82 academic year.

Major Uses of Microcomputers for Instruction in 1981-82

Grade Level	Number of Schools With Micros	Compensatory and Remedial	Basic Skills	Learning Enrichment	Computer Literacy	Computer Science
		Major Uses of Microcomputers				
Total	27,501	3,910	5,103	5,174	9,065	6,237
		(In percents of column 1)				
Total	27,501	14	19	19	33	23
Elementary	11,050	18	29	21	29	7
Jr. High	5,774	20	11	19	30	10
Sr. High	9,504	6	12	18	38	49
Combined and Other	1,173	19	6	4	34	16

It is anticipated that by 1987, 50% of school age children will be using CAI in school, and that in that year there will be 424,000 microcomputers in the public schools -- double the number currently in use.^{2}

Given figures like these, the need for teacher education in computer use is readily apparent. The questions relevant to any curriculum development pertain here as well: what is the content essential for teachers to know? what skills must they master? what degree of breadth and depth in computing is necessary? what sequence of courses is best?

The School of Education at the University of Connecticut has devised a microcomputer education curriculum in an attempt to prepare currently certified teachers in the use and uses of microcomputers in the public schools as well as address the needs of students preparing for the classroom.

For undergraduates, one credit modules are currently taught. Other modules on specific topics (LOGO, software evaluation, uses in special education, etc.) are in the planning stages. As an example, here are two such modules which are available to prospective educators.

(1) Introduction to the Uses of Microcomputers

This course introduces students to what computers are and what they can and cannot do.

The specific instruction objectives enable students to develop:

a) an awareness of the advantages and disadvantages of microcomputers, and the current trends and developments in the field.

b) a microcomputer vocabulary to enable them to formulate relevant questions concerning the use of microcomputers.

c) a working knowledge (through hands-on experiences) of the operational features of available machines, e.g., APPLE II; TRS 80, Model III; Sinclair ZX81.

d) and use an evaluation procedure for selected software materials.

e) the ability to use the various microcomputers in a direct mode.

(2) An Introduction to BASIC

This module extends computer literacy to include an introduction to programming in the BASIC language. This language is often recommended for beginning programming because of its on-line interactive possibilities. The course provides undergraduates with opportunities to develop:

a) background knowledge of microcomputer systems and programming terminology.

b) the ability to operate the various microcomputers in the immediate mode.

c) the ability to program in BASIC.

d) the ability to "debug" a BASIC program containing errors.

To address the demand from practicing teachers and public school administrators, a curriculum at the graduate level is currently being developed and refined. The core of courses viewed as necessary for this population are discussed here.

CORE COURSES

Introduction to Computers in Education -- This course reviews the various functions of computers in the educational setting and provides an introduction to computer hardware, software, software evaluation and basic programming.

Theories of Learning and Instruction -- Here theories of learning and cognition are studied as well as their applications to instructional settings.

Instructional Design for Microcomputer Software -- This course focuses on the design and development of materials for use in the classroom.

Teaching and Learning in An Information Society -- This is a workshop which analyzes the anticipated structure of the emerging "information society" based on new and developing modes of communication and information storage, retrieval, and processing; identification of specific educational needs arising from the social and economic demands of such a society; development of curricula materials, and instructional strategies and techniques for meeting these needs.

Microcomputer Languages -- This course covers the logic and structure of types of languages used with microcomputers with consideration of advantages and disadvantages of each in educational applications. Language taught include review of BASIC; and LISP, PASCAL, FORTH, and PILOT -- all at an introductory level.

Intermediate Programming -- This course continues language instruction. Currently in the development stage, it is envisioned as a practicum with solely 15 students in which the focus is on any one of three languages in which the student wishes to progress. Languages covered depends in part on student input.

Seminar -- The seminar provides a ground for synthesis, for current topics of relevance, and a basis for special projects generated by students.

Electives for those pursuing microcomputer mastery include courses which treat software materials, design, development, and evaluation in the variety of disciplines -- for example, those programs available in mathematics, science, language arts, reading, social studies, music, foreign languages, and special education. Others include a course entitled "Introduction to Microcomputers in the Classroom Curriculum," courses in use of microcomputers in research, and either courses or one credit modules in areas like word processing, data base management, VISICALC, LOGO, PASCAL, and administrative uses.

Equally important for advanced graduate students is the opportunity for research projects on computer assisted instruction. The questions for such research are extensive, ranging from content concerns, scope and sequence questions, learner-centered issues to comparison with other modes of instruction. The results of such research will form the core of future courses which will address the comparative merits of computer assisted instruction both in the public schools and in the preparation of teachers.

FOOTNOTES

1. EDUCATION NEWS, September, 1982.
2. According to Dr. Odvard Dyrli, computer consultant. Learning magazine and professor, University of Connecticut.

DEVELOPING IN-SERVICE COMPUTING LITERACY WORKSHOPS: THE ROLE OF THE UNIVERSITY INSTRUCTOR

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Unquestionably, microcomputers are here. And the message is clear to education. Microcomputers must be incorporated into the classroom. Virtually overnight, institutions of higher education find themselves under the pressure to incorporate computers into the educational processes. Baker (1982) reported that 50 percent of all secondary schools and 14 percent of all elementary schools in the United States have at least one microcomputer available to the students for instructional use. There has been a 52 percent increase of computers within the secondary schools within the past 18 months (Baker, 1982). The graduates of our universities and colleges are entering employment where computers are commonplace. It behooves us as university faculty to take it upon ourselves to mandate to our students and graduates the requirement of computing literacy. This mandate is being addressed by higher education institutions (Lobello, 1982).

Computing literacy is defined as the knowledge and ability to use computing systems as tools for the enrichment of our personal and professional lives (Lee, 1982). Thus computing literacy is a combination of skills embodied in applications of the computer as a machine (for entering data); as tools (for learning applications); and as creative instruments (for manuscript writing). This definition differs from computer literacy which, broader in scope includes computer programming.

With the emphasis on advanced technology in our homes, in our classrooms, several states have proposed, or passed, the addition of a computer literacy to their state teacher certification requirements. This mandate would require public school teachers, within the next five years, to undergo training within their teacher education program that will provide them with the ability to incorporate the use of computers into the institutional process in their field of specialization (Voorhis, 1982). Teachers' knowledge of computers and computer applications to meet these mandates is distressingly limited (Griswold, 1982). Negative attitudes and limited awareness toward computer usage appear to be deterrents for applying the microcomputer to the classroom.

Some of the uses of the microcomputer in the classroom include: as a problem-solving tool; managing records (Dallas Independent School District uses the monitoring of students progress for competency-based instruction, Sheehan, Arrasmith, & Grobe, 1982); administering and evaluating tests; calculating statistical data of student(s) record; and computer-based instruction as a complement of the professional teacher. Whatever the uses, there is an inevitability of the computerization of the educational process in the classroom.

Within this influx of microcomputers into the school system, we as university instructors have to consider how do we prepare the already-in-the-field secondary school teacher for effective use of this technology? The training we provide for the in-service secondary teacher must be relevant to their field. In-service describes those who have completed undergraduate education and are employed as teachers in a school system. Pre-service refers to university students pursuing an undergraduate program in teacher education. Traditionally, we have relied on the teachers themselves to update and remain current on trends and issues in their fields through research, self-study, and professional organizations. But the vast deluge of microcomputer information has passed the point of synthesizing for the classroom teacher. The prognosis of the impact of technology on the classroom is that only a small percentage of the teachers will become, or even want to become, computer specialists. With the rapidity of the technological advances being made in microcomputers and the increasing "user friendliness" of the keyboard, the need for computer programmers may be decreased. But there must be an understanding and appreciation for the teacher of the contributions the microcomputer can make to his/her own discipline.

The secondary teacher must re-tool and the university classroom provides the most expedient method of re-tooling. It is the role of the university instructor to develop programs that will accommodate the teacher out-in-the-field and prepare them to accept the effects of technology on the classroom.

Purpose

The purpose of this study was to delineate the development of in-service workshops providing computing literacy to home economics secondary teachers. Specific objectives were: to assess the needs of home economics teachers out-in-the-field, and to determine how the parent university serving that region could best meet their needs for applying the microcomputer to the classroom.

Methodology

Effective utilization of the microcomputer into the classroom is dependent upon the teacher in that classroom. An examination of the home economics teacher education program at our university revealed that the teachers had little, if any, academic preparation in the use of the microcomputer. Many of the teachers out-in-the-field had received their academic preparation prior to the development of the microcomputer.

Based on a grant proposal funded by the Kentucky Bureau of Vocational Education for the 1981-1982 year, a survey instrument to gather data was developed and administered to the home economics secondary teachers for the region served by our institution. Results from this survey revealed that 55 percent of the high schools had computers which were used on a limited basis; only six percent of the high schools used the microcomputer extensively in a classroom setting; and 21 percent of the high schools surveys did not have microcomputers available. Only six percent of the high schools in the survey used the microcomputer for home economics classroom instruction. Responses to the survey indicated interest in the following teacher/student microcomputer interactions: testing, 27 percent; enrichment, 66 percent; reinforcement, 52 percent; student records, 45 percent; and 12 percent indicated a desire to use the microcomputer in their home.

Results from that survey indicated a definite need toward obtaining more information about using microcomputers in Home Economics. A one-day in-service computer workshop was planned and implemented to help teachers 1) develop computer awareness as it related to the Home Economics classroom, 2) overcome computer anxiety, and 3) provide information on various types of available computer hardware. The in-service workshop, held June 1982 with 50 pre-service and in-service home economics teachers attending, addressed these topics: the scope of microcomputer use throughout the state; features, benefits of various types of microcomputer hardware; use of a classroom computer networking system; and hands-on experiences with prepared software. The evaluations from this workshop indicated a need for a follow-up in-service workshop in which the teachers would input some data to be used later by their high school students.

The second in-service workshop funded by the Kentucky Bureau of Vocational Education, was sponsored by the Department of Home Economics and held four months later, focused on the aspects of "where we are and where do we want to go" with respect to microcomputers in the classroom. Objectives of this one-day in-service workshop were to: 1) to enhance the teachers' ability to use the computer; 2) to increase the teachers' awareness and knowledge about the microcomputer; and 3) to experience a hands-on application of the microcomputer for the classroom.

The following information was shared by the participants during the first portion of the workshop: 1) available software applicable to the home economics classroom; 2) problems encountered in use of the computer; 3) computer uses in the classroom; 4) scheduling of students on the computer with non-home economics classes; and 5) the societal issues of using the microcomputer in an educational setting. Although this time of sharing could approach the elementary level, it must be remembered that attitudinal changes regarding the use of the microcomputer are required. This aspect of colleague exchange provides the teacher with the knowledge that other teachers face similar problems and issues and helps to further reduce computer anxiety.

The final portion of the second in-service workshop provided hands-on experience of adapting teacher-make tests to computerized testing. Microcomputer managed testing can utilize various types of tests -- matching, short answers, completion and multiple choice -- with multiple choice examinations providing the least flaws when using the computer. The system, used for the teacher-generated test, was designed to be operated and maintained by individuals with no programming experience. Using the test system for the microcomputer, the participating teachers found that more time could be assigned for constructing the individual test items rather than preparing a test for those items. Each participant stated the need for more in-service workshops on computing literacy for the home economics classroom, thus the idea for an expanded two-week course was developed.

In December of 1982 a needs assessment was mailed to the secondary home economics teachers in our service region to determine the format for the two-week workshop. This graduate/undergraduate short course scheduled for June, 1983 is designed to provide the development of competencies in computer assisted instruction for home economics, including the ability to: 1) read and execute simple programs; 2) use educational software; 3) talk more intelligently about computer terminology; 4) recognize examples of educational problems that can be used on the computer; 5) locate sources of educational computer information; 6) apply computer instruction in the classroom; 7) evaluate software and hardware for classroom use; and 8) considering societal influence of computers on individuals.

A three part awareness instrument has been developed to determine the effectiveness of the third workshop. Using the certainty measurement technique, 20 items will ascertain the level of awareness of teachers for microcomputer application in the classroom. Demographic items will assess personal and professional background of the participants with the third part measuring their use of microcomputer in the classroom.

The instrument will be administered in a pre- and post-test design to the participants of the third workshop, paired t-tests will be calculated to determine statistical significant differences for participants' awareness of the microcomputer. Descriptive statistics will be computed for each item of the instrument. The awareness questionnaire will also be administered to non-participating secondary Home Economics teachers in the service region to determine statistical significant differences between participants' and non-participants' level of awareness toward, and use of microcomputers in the classroom. Data derived from the awareness instrument applied in conjunction with the third workshop held in June 1983 may be obtained from the authors.

Implications

The information from this study could provide the basis for the development of in-service for graduates in other areas of concentration in home economics. If workshops are planned around assessed needs of teachers, including relevant application for their specialized area, the secondary teachers will respond. In addition, the findings from the development of these in-service workshops can be used to provide guidelines for in-service other than microcomputers. Graduates of a program need a constant updating and their parent institution (or the institution serving that region) should provide this service as part of an effective university continuing education program.

As university instructors, we need to be concerned how best to prepare our students (currently enrolled and graduates) for the technological advances available for classroom use; we need to look at the microcomputing technology that holds the potential for enhancing the classroom teaching. We are now living in the computer age. The advances in microcomputer technology will effect every aspect of education. The potential of the microcomputer in the classroom is expanding into all dimensions of various subject matter areas. The university instructor must understand the contributions the microcomputer technology is making to society, we must know how this technology can be used. We need also to communicate to our students an awareness of societal and ethical values in the use of microcomputers in education. Attention should be focused on helping prepare in-service home economics teachers to incorporate the microcomputer into the classroom. If we (the university faculty) are to provide services for the students and graduates in home economics teacher education, it is then the role of the university to provide a training relevant to the teachers' role and field.

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PROPOSED POSTER SESSION

AN INVESTIGATION OF THE SPECIAL NEEDS AND DIFFICULTIES OF SOME PART-TIME STUDENTS WHO ARE ALSO IN FULL-TIME EMPLOYMENT

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BACKGROUND

For the past ten years, as a lecturer in the Department of Physics, College of Technology, Dublin Institute of Technology, Dublin, I have been involved in lecturing to part-time and whole-time students, in a variety of different courses up to degree level.

During that time, I have become increasingly aware that, in designing courses for part-time students, little or no attention has been given to any specific requirements which these students may have. It is clear from discussions with the students, that many of them consider that the institution and the teaching method need to be more adaptive to cater adequately for their needs.

The primary motivation of the part-time students in enrolling on a course of study on a part-time basis would appear to be the enhancement of career prospects. They are usually eager to learn and they are quick to reject outmoded or irrelevant practices. Because of the greater number of 'mature' students in the part-time population and because of their contact with the 'real' world through their employment, these students have a more clear-sighted perception of their objectives with regard to a course, which may or may not be matched by the aims of the educational institution.

DUBLIN INSTITUTE OF TECHNOLOGY

The College of Technology, Kevin Street, is one of six sister colleges which comprises the Dublin Institute of Technology administered by the City of Dublin Vocational Education Committee. The work and awards of the Institute have attained national and international recognition by academic, professional and industrial institutions. Through a partnership agreement with the University of Dublin (Trinity College), graduates of professional level courses are eligible for degrees of the University.

The Institute serves the biggest student population in the Republic of Ireland, catering for the needs of 23,000 students attending a total of approximately 350 courses, 50% of whom are registered on a part-time basis.

The College character of the Institute, with almost a dozen locations in central Dublin, tries to ensure that the student is not swamped by a hugh impersonal system. Because of the specialized nature of the courses, many class groups are small by third-level standards and students can, therefore, benefit from a close working relationship with teaching staff.

PROPOSED SURVEY

In Ireland, employment patterns have changed dramatically during the past few years. More and more, industry is requiring specialised educational and training programmes to keep pace with changing technologies. Educational establishments will need to adopt a more flexible approach, if they are to meet these demands adequately. It is imperative, therefore, to have detailed information on student attitudes, perceptions and learning preferences.

In the absence of such information within the Dublin Institute of Technology, it is my intention to initiate a comprehenvise survey of part-time students spanning a wide variety of courses. As a first step, I am about to conduct a pilot survey within the College of Technology, Kevin Street. The results will be available for presentation at the IUT Conference in July, 1983.

The project consists of a detailed questionnaire to be completed by a group of part-time and full-time students. Interviews with a sample of students and also with staff will be carried out.

There will be two groups of part-time students involved in the survey. The College runs the only Professional Photography Course in the Republic of Ireland and I have been Course Director for the past 8 years. The students, who are in full-time photographic employment, attend one full day (7 hours) and 3 nights (3x3 hours) per week. After 3 years they are awarded a Certificate and after 2 further years, a Diploma.

The second part-time group, with whom I have no direct involvement, comprise these students undertaking the Science Laboratory Tehcnicians's Course, which is of roughly similar duration to the photography course. These students are in full-time employment in industrial, research, development and quality control laboratories. For comparative purposes, a group of full-time students undertaking the three year Technician's Diploma in Applied Sciences will also be included. This Diploma Course is similar in content to the Part-time Science Laboartory Technician's Course and is designed to produce trained laboratory technicians.

It is hoped that by using this approach, it will be possible to identify some of the specific requirements and difficulties experiences by the part-time students and also some institutional shortcomings encourntered by all the students.

QUALITY ASSURANCE IN CONTINUING PROFESSIONAL EDUCATION

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Reputation Ratings & Education Assessment

When dealing with issues related to continuing professional education it might be useful to consider first the available studies and researches on traditional post-secondary and higher education. The literature carries many studies related to the quality of graduate and undergraduate education. Several of these studies are concerned with the reputational ratings of higher education institutions. By far, the main rating criteria agreed upon is faculty scholarly eminence. The results of such ratings are therefore hardly surprising that the top rated institutions turn out to be those that employ research-oriented faculty.

A relatively recent study[1] on excellence in undergraduate education extended the rating criteria of institutions to include, beside scholarly and professional accomplishments of faculty, five other rating criteria. These are: 1) overall quality of undergraduate education, 2) preparation of students for graduate or professional school, 3) preparation of students for employment after college,4) faculty commitment to undergarduate teaching ,5) innovativeness of curriculum and pedagogy.

Aside from the fact that these criteria are subjective, and some are even ambiguous and lack clear definition, such as "overall quality of undergraduate education" and " innovativeness of curriculum", the results of the study show several interesting points. For instance, raters (faculty members) basically used two main criteria in judging undergraduate quality: scholarly excellence of faculty and commitment to undergraduate teaching. The results also underscore the need to consider such rating surveys with extreme caution as strong halo effects are usually realised.

Reputational rankings were also correlated with objective information about the rated institutions such as student / faculty ratios, total enrollment size, per student expenditure, type of control, and other similar factors[2]. Other criteria for quality assessment include" students' achievements in later life "," scores of entering students on standardized test"and" citations in indexes". The advantages and disadvantages of these methods of assessing quality are discussed in detail by Webster[3].

From the previous studies one may conclude that" quality" in education is a rather confused term which is often associated with faculty scholarly achievements. Moreover it is not clear how"quality" as reflected by the judgement of the rating faculty is related to the education achievement of the student.

Accreditation and Quality

On the other hand, the accreditation process, which is known in the United States, could be viewed as a means to set the ways and manners by which education institutions may be judged voluntarily. Despite the fact that the majority of institutions of higher education in the States submit to the evaluative criteria of the accrediting associations, several of these criteria were not included as rating criteria in the previously referenced studies. In a study by Troutt[4] in which he reviewed published evaluative criteria, eight areas of concern are identified as being common to the various accrediting associations: 1) institutional purposes and objectives, 2) organization and administration, 3) financial resources, 4) physical resources, 5) library/learning center, 6) student services, 7)faculty, 8) educational program.

It is to be noted however that,although the accreditational criteria are viewed by most parties as indicators of the quality of the institution and the education it offers, these criteria are not associated with a clear definition of the quality itself.

In the referenced review an investigation was made in order to correlate these criteria to student's intellectual achievement as indicator of educational quality. The available research, however, could not substantiate the claim that certain accrediting criteria assure institutional quality, nor could it demonstrate the invalidity of the claim.

Troutt also proposed that the accrediting association criteria would appear to equate higher education with a production process since the assessment of institutional quality hinges on indirect measures. Truely the concept of indirect assessment is present in both of the accreditation process in education as well as the quality assurance function in industry, but there are two important factors that might disqualify the accreditation process as a quality assurance function: First, while in industry the quality is defined as being the ability of the product to function satisfactorily in anticipated working conditions, the accrediting criteria make no attempt to define quality of education, second, for an industrial, product, which is subjected to quality assurance program, it can only be at the end either qualified or disqualified. In other words a pass/fail situation, where quality may not assume different levels for the same product. In education however, several passing grades are assigned to different levels of student's acheivements.

Troutt noted also that " Most individuals associated with accreditation would decry any association of accreditation with an industrial model of higher education". The reason for that is , perhaps, that an industrial model is generally associated in one's mind with mass production. Obviously , no educationalist would wish to be thought of as turning out a mass of identical graduates.

Continuing Education: The Need for Quality Assurance

The issue of quality in continuing education and professional training is rather new. Among the reported efforts in that field is a recent[5] US national study which analyzed university-based continuing professional education in five different fields : medicine, pharmacy, social work, education and law . The study summoned up responses of interviewed directors of continuing education units. On the issue of quality reported findings state that: " only scattering of activities, often ones identified by directors as outstanding, were designed to help participants go beyond reception of information to explore and practice applications".

In another study[6] on continuing education in the field of engineering, concern was directed to the means for assessing quality of instruction and amount of information transfer. The study addressed also the attitude of participants to evaluation questionnaires.

The concern for quality of continuing education was manifested at earlier times in the formation of a US national task force to study the definition of a unit of credit or certification for continuing education, and to develop the criteria by which these credits could be earned by participants.[7]

This effort resulted in the definition of the continuing education unit (CEU) which has been adopted since then by several university and college associations, professional societies and other instructional organizations. The criteria for the award of CEUs cover, in essence, the general aspects of quality in continuing education. Institutions awarding CEUs should, on their part, plan and implement quality assurance programs for their activities taking into account the nature of their programs and local conditions and constraints.

Elements of a Quality Assurance Program:

The objective of a quality assurance program is to provide the means for asuring that a specified activity (e.g. a program of learning) is accomplished in a planned, controlled and documented manner.

a. Quality Definition:

Before setting criteria for assuring quality it is obvious that such quality has to be clearly defined. In continuing education one could possibly define the quality of a program as the successful attainment of a prescribed body of knowledge, the achievement of a preset level of competence, or the accomplishment of a set of skills in performing a given function, all being within the planned time & location constraints of the program.

b. Analysis of the Activity:

The continuing education activity is to be broken into a set of sub-activities and a detailed analysis is carried out with regard to their importance and their impact on the defined quality of the total activity.

A level or rank is assigned to each sub-activity according to its importance[8]. Typically three levels may be adopted: Level I in which all requirements are applied compulsorily. Level II contains the same requirements but its application could be optional depending on the circumstances of the implementation of the activity.

Level III contains the normal acceptable practices.

The reason for the choice of a multi-level system is to avoid the application of unnecessary exhaustive requirements to tasks whose failure may not jeopardize the quality of the function. For instance if we consider the task of preparing handouts and reading material for a given course. The level assigned to this task could be I, II or III depending on , perhaps, the format of the course. If considerable self-learning and home study is expected then the material is instrumental in the learning process and extreme care is to be given to its preparation in order to assure that it is clear, cohesive, complete, and contains all other requirements necessary to accomplish the defined quality. On the other hand several of these requirements could be relaxed if learning is accomplished through other different means while reading material is only supplementary and reference to textbooks and other documented literature is going to take place.

It is to be noted that unnecessarily strigent requirements could have adverse effects on the effectiveness of the quality assurance program. They could lead to reluctance if they are impractical unrealistic to comply with.

c. Documentation:

Documents have to be prepared describing each action related to the quality assurance program. These documents should describe, define and specify the various criteria and levels to be complied with. They should also describe the reporting and certifying activities. These documents shall become reference standards which will be used for verification and judgement.

d. Quality Control and Quality Surveillance

The quality control function involves verification of written procedures, statements and services ordering . It also involves control of methods to be used for measuring performances, evaluating achievements and judging accomplishments. Quality surveillance is an adminstrative function where measures are undertaken to verify that actions are implemented in accordance with the quality assurance program. Individuals performing this function should be independent of any direct responsibility for the activity surveyed. They should report to the head of the institution, while the quality control function is the responsibility of the course director.

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EXPERIENTIAL EDUCATION AT THE GRADUATE LEVEL: A PERSPECTIVE ON FACULTY ROLE AND DEVELOPMENT

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Institutionalized forms of experience-based education have always been with us. Apprenticeships and other training models attest to this fact. Liberal arts education and to a greater extent, graduate education, have been slow to recognize the most pragmatic and common of learning strategies. This article examines experiential learning as a concept applied to nontraditional graduate education.

Colleges and universities from across the U.S. have developed nontraditional, often external programs which credit learning activities of an experiential nature (Sosdian, 1978 and Sosdian & Sharp, 1978). With these developments have come the definitions of experiential learning as either nonsponsored, referring to learning which occurred at an earlier time in one's life, or sponsored, referring to current learning taking place under directed conditions (Willingham, 1976). Both types of experiential learning are the focus of debate from within and without traditional academic circles. Undergraduate institutions have more readily accepted the concept of experiential learning as a legitimate learning strategy than have graduate institutions. This is particularly true since assessment and evaluation methodologies have become widely available for use at the undergraduate level, and since model programs now exist throughout the U.S. (Knapp, 1977).

For nontraditional graduate programs, the debate over crediting experiential learning is only beginning. Rarely do graduate programs at either the doctoral or master's degree levels consider the granting of credit for learning gained through experience. Graduate education is still viewed in many quarters as largely a process of intellectual growth, usually detached from other life experience, and as a series of hurdles to be crossed. Only occasionally is it associated with human development in a broader sense.

Graduate credit for learning which occurred prior to matriculation (nonsponsored) has in general not been available to students through most experimental graduate programs. Somers (1979) reported that this has finally received attention, as a Council for the Advancement of Experiential Learning (CAEL) Task Force was assembled to consider the issue. Perhaps at some time in the future, the assignment of credit for non-sponsored learning will become an option to graduate students under certain conditions.

Nontraditional graduate programs do utilize the concept of sponsored experiential learning. Typically, this type of learning is planned by faculty, students, external agents, or some combination of these, following a student's admission to a graduate program. It is the purpose of this article to examine the concept of sponsored experiential learning as it is applied at the graduate level. To accomplish this task, sponsored experiential learning will be examined in light of two critical issues: faculty role, particularly with regard to the evaluation of student growth and learning, and faculty development. Several principles related to both issues will be exemplified through discussion of the Master of Arts Program in Human Development and Education (HD/ED) at St. Mary's College, Winona, Minnesota. Begun in 1971 as an external degree program for persons employed in the helping professions, the St. Mary's HD/ED Program represents one of the earliest and most successful efforts to integrate experience based education at the graduate level.

Experience as a Learning Strategy

That graduate programs can address both the growing adult and also uphold relevant standards of intellectual excellence is axiomatic. Adult development is an implicit part of graduate education, not external to the process of study, as traditional programs often assume. Adult development is both cognitive and affective in nature and requires that learners and institutions approach adult developmental needs in a conscious, direct way. Filling the proverbial empty container may satisfy certain cognitive goals; but adults require autonomy in learning, particularly if they are to achieve personal and intellectual growth. Nontraditional programs which recognize experiential learning come closer to providing a forum for personal and intellectual development than do conventional programs.

Sponsored experiential learning usually occurs under one or more of the following conditions:

1. faculty directed
2. directed by external institution (delegated)
3. student directed

Traditional programs (usually professional) utilize faculty directed experiences in the form of internships, practica, and a variety of field courses. Such experiences may be supervised by field personnel associated with host institutions. An example would be the field service component commonly attached to master of social work programs. The third condition, student direction, provides the opportunity for adult students to utilize the experiential learning opportunities available in their environment. For example, a school teacher wishing to understand the process of and gain experience with grant proposal writing may address an existing problem by preparing and submitting an application for funds. In addition to content, which the problem and application format dictate, the student is likely to gain knowledge of political realities and social priorities, as well as skills in problem analysis, stating objectives, writing, resource location, budget development, and so forth.

Persons who have experienced the processes involved in isolating and analyzing a problem, identifying strategies for solution, and presenting cogent written arguments regarding those solutions have obtained a set of learning skills that can be reused throughout life. Educators know that much cognitive knowledge, such as that learned for an examination, is lost from conscious retention within months. While learning facts for a test may be an appropriate strategy under certain circumstances for traditional undergraduate students, it seems at least partly out of place for adult learners, since these learners must often readily apply their learning beyond the classroom setting. Graduate education, if it is to be useful in the present and relevant to future needs, must include the ability to relearn, as needed and to understand the range and structure of knowledge.

At St. Mary's College, these principles may be seen in the HD/ED Program's philosophical foundations and methods of operation.

> The program is designed to develop competence in understanding one's own growth as well as that of others with whom the candidate is in contact. The structure of the program is based on the premise that much growth occurs in the context of self-directed learning; and that rigorous, scholarly study must be balanced with experience and a deeper confrontation with theory in terms of personal meaning. (Saint Mary's College, 1972)

The psychological foundations which support this philosophy have emerged only recently. Tarule and Weathersby (1979) have effectively synthesized research bearing upon adult development, life phase, and adult learning styles.

> The message which research on adult development and learning styles has for nontraditional graduate programs is as follows: Adults are developing people, and they usually enroll in graduate programs at points in their lives in which they are either building or changing their life structure. Both the content and process of graduate education promotes development. An active focus on self chosen learning and the acquisition of new capacities and insights leads almost inescapably to a reorganized relationship with one's self and the world....Nontraditional graduate programs are in a position to respond positively to these concerns. Adult development is an implicit and inescapable component of graduate education. It is both cognitive and affective in nature, and requires an active stance from the learner (p. 12).

In a attempt to operationalize the concept of adult development as a recognizable component of graduate education, the HD/ED Program focuses on the completion of four learning contracts. Each contract is designed primarily by the student, in consultation with a faculty advisor. Translated to credits, a range of 32 to 40 semester hours are necessary to qualify for the M.A. Degree. Work toward these credits is divided among the four contracts.

It is the advisor's responsibility to assist the student in stating overall program goals, outlining each projected contract and specifying learning objectives for the initial contract. The advisor, following advisee recommendations, assesses a contract for credit value and forwards a recommendation to the Program's Director. Credits are assigned for such divergent activities as coursework at other institutions, time devoted to reflection upon experiences (practical and academic), synthesis of experience, theory and research, study of conceptual frameworks, short-term professional training programs, the development of clinical skills, and independent study. Students are responsible for identifying the method by which evaluation will occur for each contract objective and for the contract as a whole. The methodology must be approved by the student's advisor and, ultimately, by the Program Director. After the learning activities of each contract are completed, advisors are called upon to evaluate the changes which have occurred, or in a meta-evaluative sense, the evaluations undertaken directly by the student or invited third party experts.

Periods of study can be as long as the student and advisor deem necessary to accomplish the contract's learning objectives. While students design programs to meet personal needs, the HD/ED Program specifies that each student achieve a balance of theory and experience, reflection and experimentation, personal and intellectual growth. Individual programs are typically interdisciplinary, drawing from the many fields which bear upon human service and adult development.

Faculty Role

Nontraditional programs which recognize experiential learning as a viable learning strategy are, in effect, creating a new faculty role. Rather than delivering content via a faculty-selected instructional method, as through lectures, a faculty person becomes one who evaluates rather than teaches; one who, with students, identifies learning alternatives; and one who is able to appreciate human needs in addition to or in conjunction with the tenets of academic or professional discipline.

Evaluation of Students' Learning

The terms "judgment" and "evaluation," as applied in this paper, are not always synonymous. Judgment concerns an estimation based upon authority or deliberation, while evaluation refers to finding the value or worth of something. The assessment of experiential learning is a combination of these principles applied by the student, the faculty member and/or an external agent. The achievement of cognitive knowledge is, of course, relatively easy to judge through testing. The evaluation of change, both intellectual and developmental, is another matter and raises several issues. What is it that a school of social work evaluates in its required field experiences? How does one relate the process of grant proposal writing to the attainment of learning objectives? These questions can be answered by considering three evaluation strategies which have special relevance to experiential learning at either graduate or undergraduate levels:

1. task completion,
2. attained outcomes evaluation,
3. reporting.

Task completion, as an evaluation strategy, is often used by nontraditional programs. There is, of course, no guarantee that learning has occurred simply because a requisite time period has elapsed or a certificate of attendance has been granted. This is ironic because traditional programs often involve field courses, viewed solely as capstone experiences or ways of driving home what has already been learned in the classroom. The assumption here is that no new knowledge could be gained through actual experience. In reality, it is the learning that comes from experience which is important in a developmental sense and which can be evaluated, but rarely the experience itself.

Assessment of attained outcomes represents a significant and descriptive method for evaluation. This principal is demonstrated by the St. Mary's HD/ED Program, as students are required to specify learning outcomes for each contract objective. The student who has written a learning objective concerning grant proposal writing will possess at least one tangible outcome in the form of a written document. This document may be submitted for evaluation by the student's advisor. Another method would employ a third party expert who would be asked to evaluate the document, using a predetermined set of criteria or relying on personal expertise. However, the student must still identify personal growth in relation to cognitive learning. Reporting through a summary statement, which may be chronological, anecdotal, or organized in other ways requires the student to relate theoretical and practical, cognitive and affective, abstract and concrete learning in relation to the specific contract and the overall program goals. Helping students to achieve this task is, in effect, assisting them to attain closure, while at the same time performing an evaluative act. In this way, a summary statement ties personal and intellectual growth together, while measuring both against previously stated goals.

Evaluation can be delegated to students in whole or in part as a learning experience in itself. For each learning objective, St. Mary's College HD/ED students are required to specify the methods by which evaluation will occur. They may elect any of the three methods identified here in any combination, including self-evaluation based upon personal goals assessment, performance measurement, and so forth. The opportunity for faculty and students to work with the concept of evaluation is challenging. Ultimately, evaluation is the most important method by which both human development and intellectual growth can be assessed in the context of experiential learning.

Faculty Development

Faculty role is linked to experiential learning through four concerns, in addition to evaluation:

1. Planning - How is the organization of the overall program and the individual learning experience to occur?
2. Tools - What tools must be available to facilitate the tasks of planning, implementation and assessment?
3. Implementation - How will implementation occur so as to facilitate the greatest amount and quality of learning?
4. Assessment - Who will assess the student's learning goals with the student?

These concerns can best be addressed by faculty who have had the opportunity to experience developmental activities geared to their new role. By way of achieving this goal, faculty training and development should include: (1) cognizance of questions surrounding faculty role changes; (2) knowledge of adult development and learning psychology; (3) practice in preparing learning objectives which specify outcomes; (4) the use of models for evaluation; (5) assessment of specific learning experiences for the assignment of academic credit. While it is unlikely that a single faculty development program has addressed all five topics, the St. Mary's HD/ED Program provides an instructive beginning point.

New HD/ED faculty, in conjunction with new students, are required to participate in a workshop titled, "The Process of Human Development." This one credit course presents a model process for the identification of overall program goals as well as general goals for each contract. Faculty and students work in groups to accomplish clear objective statements in which outcomes are recognizable. Under the guidance of the Program's Director and other experienced faculty, the course demonstrates and then requires new faculty and students to prepare a contract based upon actual or simulated learning goals. In this way, planning is accomplished on both an overall basis and with reference to specific learning experiences. Experienced faculty cooperate by demonstrating their assessments of credit for each contract.

Unless faculty are invited to guide a specific independent study project within a contract, they do not become involved as the student implements particular contracted learning experiences. Faculty do become involved in assessing the appropriateness of contract objectives, the means to achieve the intended outcomes, and the evaluation strategies determined prior to implementation. Since experiential learning can take many forms, faculty must have access to and experience with a variety of materials and tools. These certainly include, but are not limited to, the use of tests, simulations, direct observations of performance, review of documents, expert testimony, transcript review, certification review, video and audio tape and film, as well as more conventional materials, including research papers, bibliographies, essays and reports.

Not all faculty development needs are addressed by the procedures used at St. Mary's College. Occasionally, faculty require the attention of the program's Director on an individual basis. Faculty often wish to address their role as advisors and evaluators on a student-by-student basis. A variety of appropriate faculty models have emerged ranging from highly "entrepreneureal," participating with the student in nearly all learning acitivities and experiences, to "shadow figure", fulfilling only contract assessment and evaluation functions. One fact remains clear: the assessment of sponsored experiential learning for credit and the evaluation of this learning are the key issues realted to faculty development.

Conclusion

Experience as a learning strategy, within the context of graduate education, provides a special opportunity for students to combine adult developmental needs with traditional intellectual objectives. Though the program cited in the text exemplifies a nontraditional method for the delivery of graduate education, it should be understood that all graduate programs can work to better accommodate both adult development and intellectual goals for their students. This can be accomplished, in part, through the greater utilization of sponsored experiential learning and, in part, through the development and implementation of new faculty roles. For just as adult development must be viewed as an implicit component of graduate education, so must the role of faculty be viewed as one which appreciates human needs in conjunction with the tenets of academic discipline.

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DEVELOPING AND PRESENTING CREDENTIALS IN PROFESSIONAL EDUCATION

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ST. JOSEPH'S UNIVERSITY

PRE-THOUGHTS

Experiential learning is an expression of the spirit associated with the rise of modern science. It is no accident that many of the early advocates of experiential learning were scientific thinkers. Benjamin Franklin, in his Proposals Relating to the Education of Youth in Pennsylvania (1749), urged that the practice of gardening and planting be incorporated into the study of natural history.

Friedrich Froebel (1890), a progressive educator urged greater use of activity in education. John Dewey, whose theory of experience has become the philosophic basis of the experiential movement, focused upon the connections between experience and experiment. (Enriching Liberal Arts...1979)

Although the lifelong learning concept has rapidly gained favor in other countries, apathy and retrenchment seem to be limiting the growth of this concept in American colleges and universities.

It is a crucial time in academia. The future of our educational system is in jeopardy and the need to re-evaluate our conception of how, and to what ends education and learning in America are to take place must be considered.

A case for the expanded role of learning possibilities for all individuals needs to be analyzed. As cited from Peterson is the reasoning that can be conveyed to advocate expanded adult learning services.

.Increase in the numbers of older people.
.The Education: More Education Law.
.Women seeking employment.
.Societal demands for professional competency.
.Technological change.
.Careers in transition.
.The quest for self-fulfillment.
.Individual competency needs.
.Social equity.
.Indirect benefits to society (Peterson, 1979).

A REGIONAL GLANCE AT PORTFOLIO DEVELOPMENT

> "Increasing numbers of colleges today are awarding credit through a system for evaluating the prior learning acquired by adults in experience. This system is applied to assess such experiential learning that cannot be evaluated by existing examinations for credit, credit recommandations for noncollegiate coursework, or any other established techniques for recognizing prior learning of adults. This system for appraising learning gained in experience is one of proven validity and special attractiveness to adult students."
>
> --John Strange
> (Developing New Adult..(1980)

By taking a regional glance at assessment programs for prior knowledge, this paper offers an analysis of a variety of methods used in evaluating and documenting college level knowledge acquired non-traditionally. Although each program may appear to differ on its administrative design, the final analysis would indicate that the administration of the program is the only regional difference. The theoretical structure, however, is consistent in its demands for academic legitimacy. The seven programs analyzed below represent numerous other assessment programs offered by accredited American colleges and universities from the Far West, North Central, Southern, Middle Atlantic, and New England regions. Each program will be described in terms of evaluation methodology and quality control; the administrative aspects may be found within the bibliographical data provided at the conclusion of this paper.

University of San Francisco (1975)

Methods

Students attend courses called "Career and/Life Planning" and "Advanced Writing."

Quality Assurance

Eighty-two pages of the Handbook are devoted to COMPETENCE Descriptions for many of the academic areas in which credit may be granted. These were written by the evaluating faculty with help from the Experiential Learning Associates.

University of Minnesota (1980)

Methods

Students are furnished with a copy of HANDBOOK ON PRIOR LEARNING, which helps them to define, identify, organize and document prior learning.

Quality Assurance

Academic rigor is assured by adhering to three major criteria:

1. *Clarity and appropriateness of evidence;*
2. *Emphasis on balanced relationships between theory and practice;*
3. *Concentration upon single subjects.*

Central Michigan University (1981)

Methods

The application form is a color-coded packet arranged by three categories: learning from work experience, learning from training experience, and other experiences, self, civic, volunteer, hobby.

Quality Assurance

A trained team of CMU faculty members, representing a broad range of disciplines and thoroughly trained in the complexities of prior learning, are responsible for the evaluation.

Birmingham-Southern College (1979)

Methods

A suggested list of documentation is provided. This list may be added to by any applicable type of verification: letters from employers or supervisors, any type of certificate or license, newspaper clippings, letters of referance or verification, tapes, resumes, books and periodicals read, products of work, papers and proposals, and job descriptions, official forms or records (promotions, civil service).

Quality Assurance

A combination of observations, product assessment, oral interviews, written examinations, and performance tests constitutes the criteria evaluation.

The University of Alabama (1973)

Methods

1. *Actual products such as canvases, pottery, machines should be photographed or reduced to slides.*
2. *Copies of licenses, certificates, letters, commendations.*
3. *Letters of verification (not recommendation).*
4. *Newspaper clippings, photographs, annotated bibliography, papers and proposals, official forms or records, job descriptions and/or classifications.*

Quality Assurance

A grade sheet used by evaluators documents the evaluation of a conceptual as well as a practical grasp of the subject matter and relevant knowledge beyond the specific job or setting.

Thomas A. Edison State College (1981)

Methods

The student has two options available in the evaluation process:

.review of evidence submitted, with supplementary testing, or testing alone.

Quality Assurance

The assessor is provided with a Guide which details four basic issues in reviewing evidence: directness, authenticity, breadth of learning, and quality.

Vermont State Colleges (1981)

Methods

Pertinent primary and secondary sources of validation, including certificates of award, job descriptions, and newsletter articles, are combined with test scores from independent agencies and proprietary associations in order to catalogue evidence of prior knowledge.

Quality Assurance

Students are required to attend an "Educational Assessment and Portfolio Preparation" course whose syllabus outlines in-class material, independent assignments, and deadlines.

A Close-up View of PR at Saint Joseph's

The foundation of a strong portfolio is illustrated in Exhibit I. Defined by the terms identify and articulate, this foundation represents the introduction of completely assembled professional credentials. Depicted next in the four-tiered model is a series of component blocks illustrating progress toward the documentation of a candidate's experiences. Each component of documentation consists of pertinent information related to the claim of professional competency.

PR, or Portfolio Review, is the pinnacle of the theoretical model. Having prepared an entire profile of his/her professional, voluntary, and academic educational achievements, the candidate can confidently present the portfolio for review by either instructional supervisors or employment personnel.

The theoretical model describes only the range of processes that occur when a portfolio is prepared and presented. These processes are generic; that is, they might apply to any number of academic disciplines.

An examination of the practical model illustrated in Exhibit II parallels the presentation of the theoretical model. By identifying actual practices procedures, the candidate has constructed a vivid representation of credentials.

Identify and Articulate

.The introductory stage of portfolio presentation informs the examiner of career goals, specific objectives, and personal expectations held by the candidate.

Document

.Official certificates verify the satisfactory completion of non-collegiate educational and professional training programs. They include the documentation of such activities as county intermediate unit workshops and local school system mini-sessions.

.A professional autobiography chronicles the sequence of experiences cited by the candidate for demonstrating continued growth in pedagogical expertise.

.Letters of recommendation highlight the statements of claimed competence in the professional autobiography.

.Baseline data which completes the documentation is derived from a chronology of involvement in civic and community activities.

Measure

.Clinical analyses conducted by collegiate and/or professional supervisory personnel determine the full range of strategies and techniques mastered by the candidate. The procedure for eliciting the bases for claims to competence emanates from the cycle of clinical supervision described by (Goldhammer 1969).

Evaluate

.Primary source evidence bolsters the claim for continued interest in scholarly professional achievement. Such documented evidence as publications in professional journals and presentations at conventions offers data that enhance the relative value of the candidate.

.Pedagogical materials represent creative works produced by the candidate.

Transcribe

.Transcripts from the University Registrar culminate the academic stage of the process in preparing a portfolio for review.

PR

.Portfolio Review completes the act of earning credit and applying for a teaching position.

POST-THOUGHTS

Evidence seems to suggest that the award and portability of credit for experiential learning will remain a peripheral concern for some time. The increasing adult learners presence however, may generate pressure to standardize the assessment and transcription process.

Also, competition for students, i.e., adult learners may force many institutions of higher learning to adopt more consistent and viable alternative transfer policies, which could in turn facilitate the transfer of credit for experiential learning. (Transferring..., 1979)

EXHIBIT I
A THEORETICAL MODEL

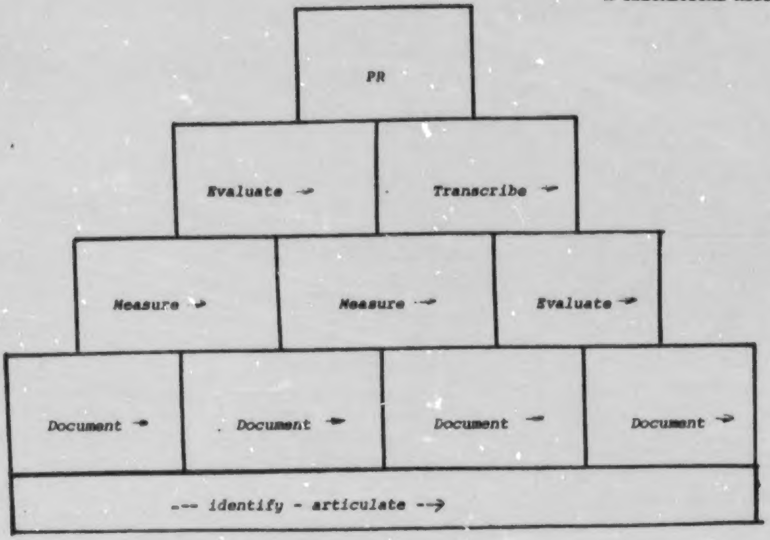
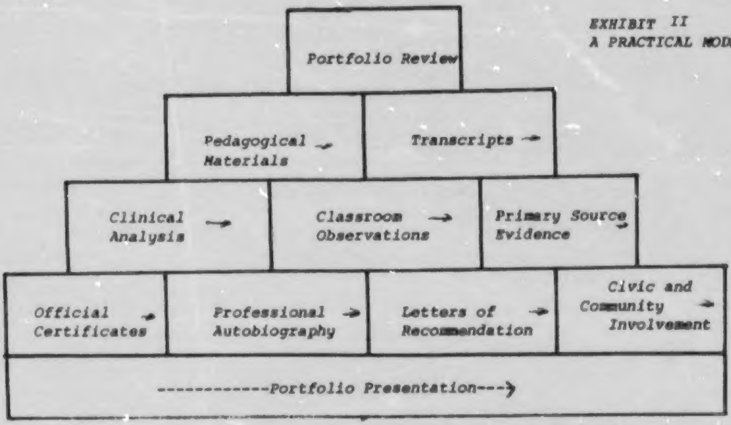


EXHIBIT II
A PRACTICAL MODEL


Portfolio Review
Pedagogical Materials →
Transcripts →
Clinical Analysis →
Classroom Observations →
Primary Source Evidence →
Official Certificates →
Professional Autobiography →
Letters of Recommendation →
Civic and Community Involvement →
------------Portfolio Presentation---→

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CHANGING GEARS IN THE HUMANITIES AND THE ARTS: BETTER LEARNING WITH TECHNOLOGY

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The electronic learning age is not just another passing craze. Learning is taking place electronically, and more of what we know, store, and recall will come to us from electronic sources. Like it or not, we are all in the midst of a microelectronics revolution. The time is fast approaching when our society will be so integrally hooked into technology at home, at school, and at the office that those of us unwilling to use the new technologies will be the equivalent of people today who cannot read and write, namely functional illiterates.

The information revolution confronts all of us--especially those of us in education--with an awesome choice: we can passively and ignorantly surrender to the information explosion--try to avoid it and become its victims--or we can actively and wisely accept it--utilize its technological advances to revolutionize the traditional model of education.

THE PROBLEM

With few exceptions, we in education have responded to the electronic learning age and its technologies with passive resignation. Thirteen years ago, in 1970, the Commission on Instructional Technology looked at us and our use of technology in education, found us wanting, and concluded:

> "a society hurtling into the age of the computer and satellite can no longer be held back by an educational system which is limping along at the blackboard-and-textbook stage of communication."

A decade later, in the 1980's, the National Science Foundation report to the President and the Department of Education found the use of technology in education getting even worse:

> "Today, people in a wide range of nonscientific and nonengineering occupations and professions must have a greater understanding of of technology than at any time in our history. Yet our education system does not provide such opportunities."

An education system limping along at the blackboard-and-textbook stage of communication, providing few, if any, opportunities for greater understanding of technology will not be able to graduate people who can respond successfully to their own needs let alone to the technological requirements of an advancing society in an increasingly interdependent world. A blackboard-and-textbook system of education in the age of microelectronics will inevitably promote detrimental and far-reaching consequences. In 1981, the Department of Education Task Force on learning and electronic technology documented such consequences and warned:

> "Continued failure by schools to utilize, in a comprehensive and systematic manner, the broad range of existing and emerging electronic technologies will hinder efforts to improve the quality of education in general, as well as frustrate efforts to improve our nation's productivity rate. This can have a significant effect in weakening our nation's prosperity and security."

Although the technology bias in favor of mathematics and the sciences has encouraged educators in those fields to utilize existing and emerging technologies, this has generally not been the case with the humanities and the arts--areas in which it is easier for us to perceive the electronic technologies as being anti-art and anti-human. Consequently, many of us in the humanities and the arts have dug in our heels to "weather the storm" of the information revolution. When confronted with any serious suggestions that the new technologies could revolutionize education for the better, many of us shrug our shoulders and say, "This, too, shall pass."

The technologies that have ushered in the electronic learning age will not "pass away" or magically disappear. Instead, they could enable us in the humanities and the arts to shift out of reverse and improve the quality of education.

WHY SOMETHING NEEDS TO BE DONE ABOUT THE PROBLEM

If education is to survive and remain viable, we have no choice but to respond realistically and aggressively to the needs of the society we serve and the information technologies that serve us. With escalating economic restraints, de-escalating college enrollments, and the career-skills orientation of society in general and college students in particular, educators will have to integrate the technologies into the learning process in order to supplement teaching in schools faced with reduced staffs and larger classes. In order to distribute education--geographically and over time--to the home, to the workplace, or any location at the school or away from the school, educators will have to turn to the new technologies. The whole system of education will have to deliver relevant and realistic lifelong learning to the entire spectrum of society--learning that can be better because of technology properly and carefully used.

The learning will be better because the broad range of information technologies--in various flexible mixes--will allow us in the humanities to reach out and teach in ways never possible before. Properly integrated into the learning process, technology will support teaching and provide the following:

1) The best kind of teaching and learning activities--those that combine the tremendous power of both hemispheres of the brain and stimulate many types of mental activity;
2) The best possible learning environment in which individual learning styles and learning delivery systems can be matched, thus creating appropriate environments in which each student can learn best;
3) A user-friendly, almost unlimited access, support environment for all types of learning: traditional and non-traditional; at the school and away from the school; and extension of the classroom and independent, self-instructional learning;
4) An information-rich, learner-centered environment with learning activities in varieties, quantities, and delivery systems never possible before; and,
5) More time for teachers to do what no technology can ever do, namely, teach concepts basic to thinking, feeling, and understanding what it means to be human; teachers will be able to spend more time providing the one essential quality in any kind of learning: human interaction.

If technology supports teaching, why do educators in the humanities and the arts not use it effectively to support their teaching? The Office of Technology Assessment (OTA) in its report on technology's impact on education answered that question by looking at a few successful schools where educators do use technology to support educational tasks:

> "The most important observation is that information technologies can be most effectively applied to educational tasks when they are well integrated in their institutional settings."

Undoubtedly, whether or not technology is "well integrated" into the educational environment depends on a number of crucial factors. Nevertheless, this integration--or lack of it--depends primarily on teachers. Not only does the public at large point its collective finger at teachers for a failing education system, but also teachers themselves are pointing at teachers. David Moursund, teacher and president of the International Council of Computer Education, pointed at teachers in a recent keynote address when he said:

> "We can provide every student with hardware and software, but if we don't have knowledgeable teachers....it won't make any difference."

Edward R. Murrow, decades ago, commenting on the then up-and-coming technology, television, pointed at all of us when he said:

> "This instrument can teach, it can illuminate, yes, and it can even inspire. But, it can do so only to the extent that humans are determined to use it to those ends. Otherwise, it is merely lights and wires in a box."

Why are teachers in the humanities and the arts not "knowledgeable" about the new technologies? Why are we so little "determined" to use technology to help us "...teach...illuminate...yes, even inspire?" Why are we so determined to let the existing and emerging information technologies remain "merely lights and wires in a box?"

WHY THE PROBLEM EXISTS

KNOW-HOW AND TRAINING. Most teachers are unfamiliar with the existing and emerging technologies. After all, anyone born before 1965 is not exactly a child of the electronic learning age. The training of teachers in many colleges and universities does not include sufficient, if any, coursework in how the information technologies can be fruitful extensions of classroom learning, nor do many universities offer or require up-to-date inservice training to help all teachers understand the technologies. Without opportunities and rewards to encourage teachers to become knowledgeable about technology, teacher determination to learn about it cannot be enhanced; teachers will continue to relegate technology to the realm of lights and wires in a box.

OPERATING TECHNIQUES. Interactive video, two-way interactive cable, VTR's, videotex, satellite broadcasts, computer-managed instruction, computer-assisted instruction, microcomputers, computer-enhanced telephone transmissions, video discs, video tapes, filmstrips, slides, in-house video production, shortwave radio, audio and video conferencing, and the many other emerging technologies all have techniques of operation that vary; even among various brands of the same technology, operating techniques are by no means standardized. The prospect of having to keep up with all the existing and emerging techniques of operation is enough to put most teachers into a state of technological shock; it does not encourage them to use technology to support their teaching.

AVAILABILITY. In many schools, the information technologies, if they are available at all, are either centralized in libraries and instructional resource media centers or they are scattered throughout various departments--usually in closets on dusty shelves. To use them, teachers must make arrangements to get them. Many of the new technologies, however, cannot be check out easily like books nor do they function at their optimum in classrooms not equipped to accomodate them. Libraries and resource centers house technologies; their purpose is to provide not to integrate technology into the learning process. It is with the integration that teachers need help.

AQUISITION AND BUDGETS. Teachers who must worry about the cost of technology and how budgets can accomodate such costs are exchanging precious on-task teaching time for technology management time. Most teachers are already overwhelmed with the requirements of teaching and class management. Under such circumstances, they are understandably reluctant to worry about the budget management of technology as well. A great deal of time, effort, and information are required to make wise acquisition and budget choices.

SOFTWARE. For many of the existing and emerging information technologies, educational courseware--software that translates performance tasks into programs--is a problem. To be sure, good courseware is sparse; it does exist, however, and with more knowledgeable and determined teachers, it can be created. Finding good courseware is time-consuming, frustrating, and painstaking. As a result, many teachers are unwilling to look for the good courseware in a haystack of poor software. Many more teachers are hesitant when it comes to creating their own courseware.

HOW THE PROBLEM COULD BE SOLVED

Can these obstacles which prevent many of us in the humanities and the arts from properly integrating technology be eliminated or minimized? Instead of simply providing the latest electronic technologies and abandoning students and teachers by allowing them to determine if and how the electronics will be used, can we provide a more comprehensive, systematic, and effective solution?

There is such a solution, the seeds of which have lain dormant in an old concept popular in the 1960's--the language laboratory. The effective integration of technology into the humanities and the arts is possible if we provide all of these disciplines with a centrally-located, technologically-rich, properly-staffed, modern communications laboratory for the 1980's and beyond.

THE MODERN HUMANITIES COMMUNICATIONS LABORATORY FOR THE 1980'S AND BEYOND

According to MIT's Seymour Papert, the introduction of technology into education usually means "...new gadgets to teach the same old stuff in a thinly disguised version of the same old way...if the gadgets are computers, the same old teaching becomes incredibly more expensive and biased towards the dullest parts, namely the kind of learning in which measurable results can be obtained by treating learners like pigeons in a Skinner box." Teaching the same old stuff in the same old way and neglecting the human being in the laboratory were largely responsible for killing the educational promise and potential of the language laboratory of the 1960's. The humanities communications laboratory of the 1980's and beyond must do what the laboratories of the 1960's were never given much of a chance to do: it must take the broad range of existing and emerging technologies and use them to create a learning environment that is designed in such a way that it changes with the needs of the learner and allows him to discover and learn by doing.

With a few broad strokes, let us look at how such a communications laboratory with various technologies might address itself to the needs of learners in the humanities and the arts by allowing them to learn by doing.

SATELLITE BROADCASTS, CABLE TV, VIDEO, AND IN-HOUSE TV PRODUCTION. With a parabolic antenna and cable TV, television programs transmitted by satellite from Europe, Canada, and Mexico can be fed to various locations within and beyond the school setting. News, drama, and entertainment programs can be used by students in history, sociology, international studies, art, architecture, foreign and second language study, as well as students in political science and business. A modest in-house, closed-circuit television facility within such a communications laboratory would allow advanced foreign language students, for example, to dub and subtitle programs and thereby enhance their translation skills. Students in the various other disciplines could use the "dubbed" programs to learn about foreign cultures, foreign business enterprises, and international politics. In-house video production could be used to address the needs of learners who wish to participate in the unsurpassed opportunities to visit and study in the great cultural centers of the world. Such students could produce radio and TV plays, skits, interviews, comics, commercials, and cartoons in the target language. These could be broadcast--via radio or closed-circuit TV--to various pocket language audience within the American society. Audio and video tapes of such productions can be edited and reassembled for classroom exercises to teach conversation, grammar, and culture.

COMPUTER AND COMPUTER-ENHANCED TECHNOLOGY. These technologies could provide specialized learning environments: 1) electronic dictionaries for English as a second language (ESL) and foreign language (FL) students; 2) business and professional language modules for occupations requiring FL skills; 3) architecture and art modules teaching culture through the architecture and art of a nation; 4) arrays of simulations such as trips to a foreign country, business and financial models, verbal and non-verbal communication mock-ups; 5) multi-media events teaching anything from inservice computer training for students and teachers, to self-instructional modules for "critical" but rarely taught languages, to career education; and, 6) electronic data banks.

No one can isolate learners from the electronic learning age. Obviously, it is here to stay. What we in the humanities and the arts must do is make sure that technology is not the only reality, that human experiences are scheduled into the learning process, and that teachers provide the one essential quality in any learning, namely human interaction.

The existing and emerging technologies produce fantastic electronic experiences; they cannot--nor will they ever--replace the need for fundamental human experiences. Technology can be integrated into the humanities and the arts, but the desire for better teaching with technology is not in the technology. If it exists at all, it exists within us.

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A CRITICAL INVESTIGATION OF THE ROLE OF EDUCATIONAL TECHNOLOGY OF THE PRE - SERVICE TRAINING OF TEACHERS IN THE REPUBLIC OF IRELAND

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As a result of careful analysis of information gathered, conclusions are presented and recommendations formulated for those involved in the design and construction of educational technology courses for trainee teachers. It allows them to compare and contrast their own courses with those offered in other parts of the country and provides them with a context against which they may choose to modify or adjust the content of their courses on the basis of the opinions and experiences of other educational technologists.

Conclusion: The Aim of Teacher Education

It has never been a claim of colleges or universities that their pre-service teacher training programmes provide the student with a fully comprehensive collection of knowledge, skill and expertise to equip him throughout his teaching career. Educationalists are constantly advocating the concept of education for change when referring to the education of young people in our society today. It appears that educational technology courses in pre-service teacher training programmes in the Republic of Ireland do not always help student teachers to respond to the challenges of tomorrow.

Recommendation: Education for Change

Pre-Service teacher training programmes should take greater account of and make provision for the student's need to cope with ways and means of dealing with accelerated rates in the expansion of knowledge. Specifically this means designing and teaching programmes which help students to:-

I) re-appraise the management of learning

II) evaluate new methods, organisational systems and strategies

III) design and produce resources and materials in response to curriculum reform

IV) conduct educational research

V) analyse the implications of educational research for their own situations.

These skills could most conveniently be clustered under a course entitled Educational Technology.

Conclusion 2: Fragmentation of Educational Technology

Many institutions in the Republic of Ireland are teaching educational technology in fragmented ways. Within and among institutions there are many differences in what is being taught, differences in how it is being taught and differences in how it is being related to the whole teacher training programme. One result is that students perceive educational technology in a variety of ways. Students need more help to integrate and relate the verious aspects of educational technology which they are receiving.

Recommendation 2: Co-operative Course Design

In providing students with comprehensive educational technology courses, course designers should consolidate, organise, restructure, design, present and evaluate as many aspects of the subject as possible, under one course title. This would mean that course leaders and lecturers would have to become involved in co-operative course design. The purpose would be to design an acceptable integrated course where knowledge, skill and expertise is shared. The most important outcome would be for the students to realise that educational technology is not just a collection of disparate ideas. Such a plan would bring a much needed coherence to the discipline.

Conclusion 3: Need for Aims and Objectives of Educational Technology Courses

In order to consolidate the various aspects of educational technology for its teachers, it would be useful to identify and list the key areas which are appropriate to the needs of the student teacher. From this list it is possible to develop and build up a resource bank of objectives which will help lecturers to design their courses. Some such banks already exist. e.g. Leeds Institute of Education (I). The 64 objectives used on the interview document for this study could also be considered because all interviewees agree that the collection represented a balanced and broad interpretation of educational technology.

Recommendation 3: Key areas of Educational Technology Courses

In order that lecturers can design comprehensive educational technology courses for trainee teachers this recommendation proposes that specific objectives should be derived from the following key areas:

The use of objectives
Lesson planning and design
Evaluation and assessment
Operation of instructional media
Design, production and presentation of teaching and learning media.
Learning theory
Self-instructional techniques
Simulation and games
Computers in education
The management of learning resources

Conclusion 4: Communication in Educational Technology

Each college or university visited in this study had its own set of institutional constraints which made the teaching of educational technology unnecessarily difficult. Sometimes there was confusion and frustration about the precise role of educational technology The work of most teacher educators involves some educational technology. Their disciplines are permeable to technology. Students therefore should be helped to understand the differences between the work of educational technologists and that of teachers of other disciplines.

There seems to be a lack of communication between the teachers of educational technology at both institutional and national level. It would seem that a formal communications system could help devise solutions to many of the problems outlined above. The type of system envisaged is described in the following recommendation.

Recommendation 4: Establishment of a National Curriculum Review Body for Educational Technology

A National Curriculum Review Body for Educational Technology could facilitate communication within and across teacher training institutions. At institutional level it could assist in the design of a curriculum for educational technology which would meaningfully integrate and support curriculum studies courses. At national level it could provide a forum for constructive discussion on the theory and practice of the discipline.

Other possible functions of this body could be:

(I) To provide for regular and frequent meetings of educational technologists. These meetings should include curriculum revision sessions, courses, conferences and lectures. The venue for these meetings could change regularly to accommodate each of the 14 institutes offering pre-service teacher training courses.

(II) To provide a list of objectives for educational technology courses. Some of the topics from which these objectives can be derived are presented in Recommendation 3.

(III) To encourage research in educational technology and to desseminate findings to practitioners.

(IV) To monitor developments in the application of educational technology in professional and industrial training centres throughout the country and to report useful findings to educational technologists.

(V) To ensure that the central committee of the proposed body is comprised of at least one representative from each of the following:

- a) The Colleges of Education
- b) The University Department of Education
- c) The Department of Education
- d) The Primary School Teachers Organisation
- e) The Association of Secondary Teachers
- f) AnCo - The Industrial Training Authority
- g) Any other appropriate group approved by those above.

(VI) To assist in designing educational technology courses which are relevant to the needs of newly qualified teachers, by funding appropriate research.

(VII) To be responsive to developments in all aspects of educational technology.

(VIII) To prepare structures upon which a National Council for Educational Technology could be formed. Within this national council a variety of sub-committees could be involved in such activities as determining the cost effectiveness of educational technology or investigating its potential contribution to specific topics such as the teaching of the Irish language.

Conclusion 5: Communication between Teachers and Teacher Educators.

Since teacher education should be a continuous process, teacher educators should become more involved in the in-service education of teachers. The practicing teacher can benefit from the expertise to the teacher educator who in turn has much to learn from the experiences, insights, fears, hopes and perspectives on the current problems of educational practice as expressed by those facing schoolchildren every day. The quality of such mutual exchange of ideas between teachers and trainers must be good for the profession.

So what are the immediate implications of this for educational technology in pre-service teacher training programmes? This study has attempted to describe the role of educational technology. While determining this role, two important considerations have emerged:

1) Although it is possible to quantify its role to some extent, this study cannot claim to measure the precise impact of the role.
2) Most teachers of educational technology in the Republic of Ireland would agree that the image of educational technology is not quite as strong as that presented by other disciplines. Equally educational technology does not have a high profile among classroom teachers.

In order to measure the impact of its role and to improve its image this study makes two further recommendations:

Recommendation 5: Educational Technology and the Probationary Teacher

A representative sample of teachers who have just completed the probationary teaching year should be identified. A questionnaire should be designed to determine the extent to which these teachers can identify ways and means through which their training in educational technology proved useful to them in their first year of teaching. In the same way they should be able specify aspects of educational technology which in their view, contributed little to their particular needs. They could propose areas in which their training programme could be improved and made more relevant. The responsibilities of the teacher educator do not end when the student leaves college.

Recommendation 6: Improving the Image of Educational Technology.

To improve its image, educational technology in Ireland needs greater academic respectability, it needs to publish rigorous research and it needs to be given the resources to meet the research needs as they arise. The proposed National Council for Educational Technology should provide such a research centre, an information centre on developments in the field, and a training centre for short intensive courses for qualified teachers. In association with third-level institutes, the Council should be able to offer diploma and certificate courses for trained teachers, particularly for those who qualified more than ten years ago.

Those responsible for the initial training of teachers should be heavily involved in in-service education. This would enhance the quality of pre-service training. Student teachers should be encouraged to recognise that their initial training is just a beginning and that they should participate in further education programmes throughout their teaching careers.

Those responsible for the teaching of educational technology in the colleges and universities have a difficult task. They deserve a great deal of credit for their perseverance in circumstances and conditions which are frequently less than ideal. In all cases their contributions to this study were forthright and unconditional. It is hoped that their task would be made easier by the implementation of the recommendations of this study.

The information used in this study was collected between March and October, 1980. Since then the colleges of education have extended their teacher training programme by one year. How has this affected the role of educational technology? Will university departments of education need to extend their pre-service teacher training programmes in reponse to the demands of the workplace? The impact of technology on the domestic scene in the past five years has been unprecedented. What are the implications of this for the classroom? What has been the impact of the Educational Broadcasting Report (2)?

What can we learn from the experiences of the teachers of educational technology in other countries?

These are just a few of the many questions still to be answered.

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IMPROVING THE COLLEGE CURRICULUM THROUGH TELECONFERENCING

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Nineteen years ago sociologist William Ogburn (1964) introduced the concept of "cultural lag". By cultural lag, he meant not only the time required to diffuse the invention in the society, but also the time required for the culture to find a functional role for the invention. College educators, too, are subject to cultural lag in the adoption of instructional technology.

Innovation in the information and communication technologies will not alone produce significant improvements in instruction. Many of our college closets are filled with the technologies of past decades: television monitors, laboratory equipment, recorders and projectors. While many of us use these devices, we can also point to equipment that gathers dust. What seems to determine if an instructional technology is used is if a legitimate place for it is found in the teaching of courses. Educational lag is thus the time span between when an instructional technology is introduced and when it finds widespread adoption within university teaching. As educational leaders, it will be our curricular planning and development efforts that determine if the technological changes of the coming years will impact on instructional programs.

This paper is about the adoption of an old technology -- 44 year old technology to be precise. The telephone conference call was first used for instruction in 1939 by the University of Iowa. Audio teleconferencing is not new. What is new is the curricular planning and educational programming made possible by this technology.

Teleconferencing is not simply restricted to the connection of a lecturer in one location with a class in a second location. Rather, teleconferencing may involve the simultaneous instruction of student groups in multiple locations by one or more instructors from the same or differing locations using the telephone as the medium.

Each Monday American Airlines holds a teleconference meeting of the management of its 110 offices worldwide. Why does American Airlines use teleconferencing? Travel costs are not the issue. Time is; a day would be expended in travel to bring management together for a hour meeting. Like most other major corporations, American Airlines has specific training, development and continuing educational needs. Could your college or university meet these needs in American's 110 offices worldwide? Is your college ready for the curricular implications of teleconference educational programming?

Differences among colleges and universities will dictate that each will be interested in different applications of teleconferencing. However, each must consider altering both its program offerings and program development methods in order to maximize the benefits of teleconferencing. These changes parallel those stimulated by other technologies -- computers, interactive television, videotext data bases, etc. This paper describes the curricular and planning implications of telephone conference teaching. The paper is based on field research conducted at Iowa State University.

Let me begin by describing the basis of my perspective on the subject. My interest in audio teleconferencing evolved from the search for better strategies for the Higher Education Section at Iowa State University to deliver inservice programs and graduate courses in community college education off-campus. The result of this investigation was a strategic plan which included statewide and regional teleconference programming. Our experience has been shaped by the media at our disposal: (1) The community and technical colleges of Iowa are linked by a dedicated line, two-way audio teleconferencing network -- the Telenet. (2) The three public universities share a teleconference bridging switchboard -- the Telebridge -- which is separate from the community college system. (3) Additional teleconference services are available from such companys as Darome or Kellogg Communications -- both provide such services (including toll-free caller numbers) to users throughout the United States. (4) Also some modern college telephone switchboard have limited bridging and linking capabilities. Planning of teleconference instruction is effected by the capabilities and limitations of the particular system used.

Factors and Assumptions. Audio teleconferencing is a discrete technology. It is not an older version of interactive television, any more than the blackboard is an older version of the carousel projector. Each medium is more effective than others in specific environments. Interactive television and one-way video/two-way audio teleconferencing require specially equipped rooms and thus are bound to locations with the appropriate equipment. Audio teleconferencing can be initiated from any place with a telephone -- one strength is the access it provides.

One evening during the winter of 1981 an ice storm paralyzed transportation in the upper Midwest; the interstate highways were closed as were the airports. That evening Iowa State provided a teleconference continuing education program for over 120 persons from 20 colleges including speakers from the Pacific Coast. No one was required to travel; no one was stranded by the weather. Costs for a comparable face-to-face meeting would have prevented many from participating. Employee release required for participation in the program was negligible; a comparable face-to-face conference might require up to 3 days away from the job. The educational program was reaching a audience otherwise unreachable. It was easier for individuals to access educational opportunities.

Teleconference instruction requires new knowledge and skills in curricular planning, design, and in teaching. Lectures should be broken into 10 to 15 minute segments, interspersed with dialogue. Seminar leaders cannot simply write on a blackboard or handout an outline of the day's presentation. Advance planning and coordination are needed. Effective teleconferencing requires the use of new strategies to promote effective learning, to promote the acceptance of the medium as a learning tool, and to generate a sense of group participation parallel to face-to-face communication (Monson, 1978; Williams, 1978).

Unplanned adoption of teleconferencing can change the character of college instruction for the worse. Unplanned teleconference programming can do as much to discourage learning as carefully planned teleconferences can bring students in contact with new ideas and knowledge not readily available to them by any other means.

Instructional technology is changing not only the delivery, but also the nature of instruction (Adams, 1982). Courses and programs on specialized topics become financially feasible in rural and remote locations -- instruction and expertise formerly available to large conference groups in hub cities. Iowa State recently presented a short course on the subject of "Student Retention Strategies" using teleconferencing. Experts from Colorado, Florida and Illinois were used in the course, and students located towns with populations of less than 50,000 participated from their place of work! Without teleconferencing, the clientele would not have been tapped, the expertise would not be national in stature, and the quality of the program would have been deminished. Teleconferencing, like other new media, has augmented the quality of instruction.

Goals and Objectives. There is a symbiotic relationship between curricular goals and instructional technology. What is to be achieved (goals) are generated from a conception of what its achievable (Conrad and Pratt, 1983). What we have experienced in our research on teleconference instruction is a rethinking of programmatic goals based on the technological expansion of what is possible in instruction.

There have been several educational by-products of teleconference instructional planning: First, off-campus instruction has become reliable. Previously, off-campus courses often did not meet the required minimum enrollment and were cancelled. Over the past three years of teleconferencing, only one course was cancelled due to low enrollment. This has resulted in dependable course schedules from which a student plan of study can be constructed. Student goals and program goals become greatly more attainable.

Secondly, the quality of off-campus instruction has been enhanced. Instructional teams, panels and forums of experts from diverse locations are easily assembled. Travel and its toll on the instructor have been diminished. Less sections of the same course have been needed, so the range of offerings has been enriched. Because teleconference instruction made more evident the need for instructional aids (e.g. visuals, printed materials), the quality and quantity of supplemental materials have grown for on-campus courses which have previously been taught via teleconferencing.

The educational programs colleges and universities provide have been traditionally designed for a particular geo-socio-economic group: the goals and objectives of the course of study have been formulated with targeted clientele in mind. Teleconferencing eliminates those boundaries and stimulates instructional dialogue between college groups. In 1983 students in the Higher Education program at Iowa State University plan to meet in teleconference with their counterparts in like programs at other universities throughout the United States. The instructional medium overcomes any parochial tendency of curriculum bourn of locally developed program goals.

In 1982 the adult education directors of the fifteen Iowa community colleges committed themselves to each develop a teleconference educational program and to share it with the other fourteen. Those programs, by virtue of the medium, can call upon local, state, national, or international expertise. Likewise, those programs can be delivered to any location where there is a telephone - locally, statewide, nationally, or internationally. Thus, the extent to which an institution provides services, what areas are served, and the nature of those services are important questions of in planning effective teleconference instruction.

Another important strategic planning area related to teleconferencing is the extent to which productivity improvements will be expected in the various colleges. While teleconferencing should be viewed primarily as an instruction delivery medium with specific applications in which it is most effective, it also is reasonable to expect cost-savings to result from the use of the medium.

Resources and Priorities. The choice of goals and specific objectives is dependent on the availability and source of resources necessary to support such choices. In this regard, four general areas merit discussion: sources of cost, sources of funds, a resource strategy, and priorities.

Relevant costs of teleconferencing include hardware, long distance charges and necessary support, that is, programs and personnel to develop, market, and produce the system. On the Iowa

Community College Telenet system, we estimated the costs to range from $25 to $32 dollars per hour for telephone charges and program development support when sixty percent of available time is scheduled.

Several actions can be taken to reduce costs. Equipment can be standardized, and a policy of bulk purchasing can reduce costs. There is also the possibility of a special vendor relationship with the telephone company; training of telephone company employees (made possible through teleconferencing) might be bartered for reduced telephone line or long distance charges. The pertinence and quality of such programs is a key to such a special vendor relationship.

On the income side there are several sources of funding. A first source is the operating savings accrued from faculty productivity increases. A second source is from selling time to other educational institutions so that they can present their own programs and courses over the system. Much of the Iowa Telenetwork cost recovery has been through such sales of system time to other colleges and universities. A third profitable income source is the sales of system time to businesses and industries without their own teleconference facilities. Colleges can provide such clients with modern teleconferencing equipment, meeting rooms, program planners, and supporting media, such as overheads and videotape players for business meetings.

To strategically plan its own educational programs, a college or university needs to identify goals and a corresponding resource strategy. College administrators should determine the proportion reliance to be placed on each of the aforementioned funding sources. Then, educational programming can be developed that is consistent with fiscal realities. From that resource strategy should come specific guidelines for the development of curricular proposals and scheduling (Schmidtlein, 1974). Obviously, proposals from other colleges or from outside users will have to stand on their own merit in order to attract new clientele. But the important notion is, however, that the resource strategy chosen serves to direct teleconference planner in redefining the role and scope of instruction.

The medium is discrete. Its appliations are different from those of TV instruction or microcomputer assisted instruction; its applications reduce time, distance and cost. One such application is college instruction directed to clientele previously untouched by higher education. Careful planning of instruction mindful of the capacities of the teleconference medium can enhance curricular scope and quality and can increase the expertise and the flexibility used in instruction.

Planning, required in order to maximize the benefits of teleconference instruction, is fundamental. First the factors and assumptions undergriding the development of curriculum using teleconferencing need to be analyzed. Secondly, goals and specific objectives for programming should be established. From these first two steps, college policies and organizational structure for teleconference course development can be derived. By employing such strategic curricular planning, the potential for greater and more effective instruction and service by colleges and universities can be realized.

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TEACHING WITH TECHNOLOGY IN INDIA - SOCIAL DIMENSIONS AND DEMANDS

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Any technology which increases, the rate of learning, enables the teacher to teach less and learner to learn more. It has been established by a number of educational and social scientists that the use of various technological innovations contributes substaintally to achieve these objectives. This is because these innovations provide two channels of access to mind which can be used simultaneously through eye and ear.

Use of technology in education in India is relatively new. This has mainly two objectives. i.e. to extend the frontiers of learning to remote parts of the country where formal methods of learning can not be employed effectively, secondly to convey certain important messages pertaining to community life such as adult education, health and family planning and adoption of new production technologies in agriculture and animal sciences.

The All India Radio's (AIR), Home Service Programmes are being beamed through 157 transmitters for over 500,000 hours each year and cover about 77.63% of the geographical area of the country and 89.35% of the population. To-day AIR is one of the largest radio news organisations in the world employing over 12,000 persons.

A run down of the number of stations in the country beaming programmes to specific target audiences illustrates range and variety of home service.

School broad-casting	35
Programmes for forces	14
Industrial Programmes	26
Rural Programmes	53
Farm and Home Unites	60
Women's Programmes	50
Children Programmes	55
Tribal Programmes	27
Youvvani (for youths)	22
University broad-cast	5
Health Programmes	33

The critical analysis of these programmes indicates that most of these programmes are for informal education. The component of formal education is relatively small. Eventhough these have some material for entertainment so as to make them interesting to the listeners. In addition to this, the AIR also has a regular commercial service which caters solely for the entertainment of listeners.

EDUCATIONAL RADIO :

Educational programmes for schools are broad-cast from Delhi, Calcutta, Madras and Bombay as well as some other cities, twice or thrice in a week for a duration of about 30 minutes. About 20,000 schools out of more than 700,000 in the country have their own radio-sets and amongst these about 40% listen to these programmes more or less regularly. No doubt the coverage is rather in-adequate, but this is mainly due to in-adequate resources. It however amply illustrates the potential of this medium for extending education to a large segment of the population. These programmes are however not listed in the regular schools time-table.

While the B.B.C. Radio policy is "Radio is first and foremost, extension and enrichment of experience through source of hearing", the AIR's school broad-casts are curriculum and school-room oriented. The quality of these programme is rather uneven, which are formulated in consultation with the consultative pannels for "School Broad-cast" at each station. These pannels have representatives of State Government, educational departments, principals of schools and AIR.

The main difficulty in the effective use of Radio broad-cast for formal and informal learning in India is the diversity in the languages spoken, cultural and social environments. Therefore, it is not possible to formulate a single programme for education for the entire country, using available expertise in the field of education and broadcasting. Consequently, the programmes have to be devised keeping in view the specific needs of the local language, social and cultural back-ground, which means larger investment. In the absence of adequate financial resources and technical personnel, effective use of Radio as an instrument of learning has been possible in India only on a limited scale.

UNIVERSITY BROAD-CASTS :

AIR helps the Universities of Delhi, Punjab (Chandigardh) and Punjabi University at Patiala in their correspondence courses. However, the basic responsibility with regard to these courses lies with the respective universities.

These programmes are found to be quite popular and useful. However, if the AIR is to increase its activity in this field, it will need greater quantum of investment. A separate Radio channel as NHK of Japan can be introduced if requisite funds are forth-comming. A proposal to start a National Institute of Correspondence Courses to increase these facilities is already under the active consideration of the authorities.

Broad-casting in India has been considered as a social service dedicated to the development of the country and the education of the masses. It has tremendous potential since it covers almost 90% of the country's population. It is estimated that in 1978, there were 21 million receiving sets in the country which included 200,000 community sets. However, as per UNESCO standards, this number is inadequate and it should have been 110 million for the countrie's population of 550 millions.

The AIR has a audience research unit which conducts surveys in the listening groups, to evaluate the impact of educational programmes broad-cast by them. These studies indicate that the Radio is an important source of news and information in the rural areas. The impact of improved technology in agriculture broad-cast through radio particularly in popularising high yielding varieties as also other production practices has been amply-demonstrated.

Evaluation of education broad-casts particularly for formal education is not being done systematically since a number of States are involved and the population covered is large. However, a case study conducted by AIR Trivandum in Kerala State with respect to teaching science subjects and mathematics employing a systematic approach has revealed that radio broad-casts help the students to learn science as well as mathematics more thoroughly. This study was conducted with two groups of students, one which was exposed to radio broad-casts and another which was given only formal class-room lectures were evaluated seperately through regular tests. The study indicated that the students exposed to radio broad-casts had a better grasp of the subject and could do better in tests.

EDUCATIONAL TELEVISION (ETV) :

The primary aim of TV in India is education of masses, the other aims being information, entertainment and improvement of economy.

The distinct advantage of TV is that large numbers can be reached by experts in the field of education. It can be gain-said that visual demonstration of rare and complex material do markedly improve presentation aspects of the physical sciences, medicine, geography and performing arts.

Unlike in the developed countries namely U.K., Japan and USA where a well-organise educational Television system is functioning, this method of teaching in India is at present in-relative infamcy.

At the end of 1980, the total number of television receivers in the country stood at 9,20,000 covering about 2% of the country's population, with 18 transmitting centres. The number of transmitters has now gone-up to more than 40 as a result of installation of new transmitters connected to INSAT-1a and later to INTEL-SAT satellite. Colour TV has also made a debut in India during the IX Asiad hosted in November,1982 at Delhi. This has boosted the popularity of TV tremendously and its potential as an instrument of education, information and social change has been finally established.

Television teaching lessions in science were started by Delhi Television in 1961 with a view to imrpove the standards of science teaching at the secondary level. At that time some Delhi schools did not have proper labs and qualified science teachers. These handicaps were saught to be over-come by the visual TV medium. This experiment was evaluated by an UNESCO expert Dr. Paul Newrath in 1969 and he concluded that ETV has amply proved its usefulness as an aid to the teaching of science subjects. This project has been continued during the last two decades or so.

Delhi Televison covers a much larger area now since more number of receiver sets have been installed. According to a recent survey by the National Council of Educational

Research and Training (NCERT) on the utilisation of ETV in schools in Delhi indicates that about 38% of the 500 schools are provided with receivers in secondary schools for which 16 lessions are tele-cast every week.

Bombay TV also transmits educational programmes for secondary school students for two hours a week. With the extension of satellite of more transmitting centres, educational tele-casts, will naturally increase during the years to come. For the effective use of this medium for educational purposes, a proper co-ordination between different authorities namely the educational experts, the local authorities and the central departments controlling the televison broad-cast will have to be effected. It has been suggested that the educational institutions should be granted a franchise for tele-casting the educational material. This would empower the national institutions of higher learning to use low power televison transmission only for the propogation of quality education to the larger masses of students and others.

THE SATELLITE INSTRUCTIONAL TELEVISON EXPERIMENT(SITE):

In 1967, an UNESCO expert mission made, with the co-operation with the Government of India, a study on the use of satellite for national development. It recommended that this activity may be taken-up. Accordingly, in 1969, Department of Atomic Energy entered into an agreement with the National Aeronautic and Space Administration (NASA), USA for the loan of a satellite free of cost for one year, starting from 1975. It was the first experiment ever to relay educational programmes direct from the satellite to receivers in 2400 villages scattered over 6 selected regions in Orissa, Madhya Pradesh, Rajasthan, Andhra Pradesh and Karnataka. Besides conventional receivers in 2500 villages and towns got the programmes through earth transmitters which picked-up the satellite signals through Receive-only-stations.

The four hours tele-cast beamed every day from earth stations at Delhi and Ahmedabad concentrated on programmes on education, health and family planning. Of the four hours daily tele-cast, the 1½ hours was aimed at pre-primary and primary school children. During this periods, programmes were tele-cast 22 minutes each day in Telegu, Kannada, Oriya and Hindi languages and were watched on community receivers installed in schools, so that televison was regarded as a part of the educational system. The goals of these school broad-casts were two fold; (i) To make school more interesting and so reduce the drop-out rate; (ii) To improve children's basic concepts and skills, promote aesthetic sensitivity, instill habits of healthy living, bring awareness of modernisation of life and society.

The social evaluation report, on SITE published in 1977 indicates that the school inrolment or the drop-out rate was not affected by the introduction of TV in schools. It, therefore, proves that these factors depend primarily on social and economic parameters and not on the attractiveness or otherwise of the school curriculum.

It was however not possible to evaluate the impact of this experiment on the other aspects namely, improving the children's basic concept and skills as the period of one year was small for the purpose.

AGRICULTURE

Following objectives were set for SITE :

1. Dissemination of information and demonstration of dry-land farming etc., advise on poultry and animal husbandry, recommendation of practices for crops and their management and so forth.
2. Broad-cast information regarding organisation in districts which are responsible for the supply of agricultural inputs such as seeds, fertilisers, implements and for services in marketing credit and so forth.
3. Giving advise on demonstration of pest and their control.
4. Broad-cast wheather fore-casts and market-rates.
5. Narration of success stories of farmers preferably within the region and other relevant news.

The SITE had an ambitious goal in promoting new agricultural practices like dry-land farming, use of fertilisers etc. The SITE evaluation report says that there were some gains although they are not statistically significant.

HEALTH :

Though one year is a rather short period for adopting innovation in health practices, the report says that SITE gave rise to modest gain. On the practices seeking medical aid for the delivery of babies , the change brought about was minimal. The reason being that adoption of this practice depended on the availability of health personnel in the villages and also on the ability of the people to afford "services". It was not possible to collect the data on nutritional aspects.

FAMILY PLANNING :

The report states that the adoption of vasectomy was 2 to 8% higher in the SITE villages. However, these data ~~is~~ are not reliable because of over-reporting by males in certain cases. It is generally admitted that a years time is too brief to change an important social practice.

In spite of all the above mentioned limitations, the results from SITE indicated :

1. SITE reached 60% of the village audience within one year while radio was able to reach only 40% in the last two decades.
2. TV was the most preferred source of information.
3. Agricultural programmes were most liked programmes.
4. Half of the audience reported that they understood most of the programmes to a great extent.
5. Half of the audience discussed with family members what he saw on TV and 30% went out of their way to discuss it with people other than family members.

SITE, therefore, clearly demonstrates the tremendous potential of the TV in imparting education to a large section of the population under diverse geographical, social and economic conditions. The effectiveness of this medium will naturally depend on the quality of the soft-ware employed.

One can say with some amount of confidence that with the accumulation of experience and expertise, it should be possible to prepare programmes which will be effective in bringing about the desired changes in the educational standards of the viewers.

LIMITATIONS OF EDUCATIONAL RADIO & TV BROAD-CASTS :

1. TV and radio are one way channel and unless it is combined with correspondence or with some special arrangements in the class-room, it is not possible to indicate as to how much a student has got out of a lesson. The student has no control over the pace of the lesson. Moreover the TV and radio can not cover all the areas of learning. For instance the development of critical or analytical reasoning and creative expression necessitates a close inter-play between teacher and student, which is beyond the realm of a TV or radio lesson. Further, these media stimulate a teacher more than student and can improve his performance, but not the students',without guidance from his teacher.

2. A TV or radio lesson is of little use if it is not made locally about a particular subject, for a particular class, in a particular area. This would mean many production and transmitting centres.

3. TV and radio can only be an aid to teaching. It can not replace a teacher. There is yet no evidence of its success, without the back-up of other infrastructure. Thus broad-casts can extend learning outside school, and can supplement school studies (e.g. supplementary broad-casts by BBC and NHK of Japan).

4. TV is a prohibitively expensive medium and can never be used as a cost-saving device.

5. Radio is 10 times cheaper and its audience much larger. Its maintenance expenses are also much less. Available data indicate that there is not much difference in the effectiveness of radio and TV on students who study by radio do as well as those who are taught with TV. Australia combines radio (not TV) with correspondence lessons to impart education to students in far-flung farms accross the land.

In conclusion the technological innovations in teaching can best serve as aids to up-grade the standards of teaching in secondary schools and universities. They can never replace a good teacher. In the traditional Indian concept the teacher-disciple relationship is vital if the disciple has to acquire knowledge. This tradition is still being maintained in India in some of the more intricate systems of learning namely, music, dance and higher philosophy where there is no documented source of knowledge and the teacher essentially enriches the disciples life by transferring some of his own rich and varied experiences cultivated by him through the years. Therefore, irrespective of the technological advances a good teacher will always be inevitable if we have to produce responsible, dynamic and socially conscentious citizens who are needed to steer the destiny of Nations to their cherished goals of equality, fratenity and social justice.

In the ancient Indian tradition a teacher (Guru) is treated by his disciples and society with veneration equal only to Gods, which is aptly expressed in a Sanskrit verse given below. It essentially conveys that a teacher(Guru) is not only equal to Gods but is also equivalent to the cousmic principles behind the functioning of the entire universe.

"Gurur - Brahmha - Gurur Vishnu
Gurur - Devo Maheshvarah
Gurur Sakshat Param - Brahma
Tasmai - Shri Guruvennamaha "

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TOWARDS A METHODOLOGY FOR A STUDY OF UNDER-GRADUATE STUDENTS IN A NATURALISTIC SETTING: A Pilot Project.

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……

A. Introduction At the end of the 1981/1982 academic session I once more confronted my failure with a perennial problem, the first-year Business Studies students, to whose Behavioral Science course I had been assigned nine years ago. There had to be a way, I told myself, of making this course a more rewarding experience both for these vocationally-oriented students and myself. During the Summer Vacation I thought about the problem and designed a 'learning' programme which would be introduced in place of the more traditional teaching programme.

I prepared a handout for the students explaining the aims of such a programme, contrasting it with the more conventional approach to which they had become accustomed in schools, and when I met the 70 students for the first time in September 1982 gave each one a copy. A schematic outline of the syllabus to be covered was also included in the handout, and a description of the format for the group learning sessions.

To allay anxieties I set a date for a students' Forum to be held five weeks later to provide the opportunity for students to evaluate the course and make suggestions for change.*

The students were then asked to locate the other members of their groups and to choose a representative.

For the first five weeks the hour scheduled by the Polytechnic for the formal lecture was used in the following way:

At the beginning of each session I gave out an unseen topic which could be discussed on the basis of students' general knowledge and experience. The groups were asked to formulate questions for further research when they had reached the limits of their knowledge and understanding of the subject under discussion. This research would provide the material

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This value idea was derived from Kolb (1971) where a model for renegotiation devised by Sherwood & Glidewell is described. The administration had already allocated students into 6 groups ranging from 11 to 15 in size to fit in with organizational planning as well as the exigencies of the present economy drive in Higher Education.

for a group project.

The topics set over the initial five-week period were:

What is meant by heredity?

Is human behaviour instinctual?

What do we mean by 'society'?

Discuss the basic differences between man and animals.

Discuss the effects of the family on the individual in early childhoodl.

The one hour per week allocated to each group for Behavioral Science seminars was devoted to working on the group project.

B. STUDENTS' FORUM: The attendance at the Forum was high. I circulated an agenda to guide the groups' evaluations of the Learning Programme; in addition ballot papers were distributed to each of the students asking which of three teaching methods they would prefer for the future. Most students indicated which seminar group they belonged to on the ballot paper, this proved to be quite useful.

The results showed that most students would prefer a format somewhere between the formal lecture/seminar programme and the relatively unstructured way in which they had been working since the commencement of my course. Of the 65 who voted, 13 wished to be taught in the conventional mode, 20 to retain the existing structure, whilst 32 opted for something in between. The structure which was implemented after the Forum was based on these comments and further consultation with the students. The consensus favoured a clearer structure, particularly more guidance in the form of the occasional lecture. From then on my role was somewhat more clearly defined; up to the time of the Forum I had played a somewhat 'shadowy' part in the students' work. However, no opinions were expressed as to the extent of my participation and intervention in the seminars: in the weeks following the Forum I had to judge intuitively whether or not my presence was welcome - sometimes I was, firmly but politely, asked to leave. As time went on I was more readily accepted.

The format which was agreed was a lecture every [illegible] weeks when a new topic was introduced e.g. The Family, Education, Inequality. The lecture was to provide guidelines for the study of the topic, not an exposition. The purpose was to suggest what kinds of questions could be asked, and it was accompanied by a handout which confirmed the substance of the lecture and also contained a list of relevant reading material. This approach was favourably received as it provided the guidance which had hitherto been lacking.

During the three-week periods, the seminar time was used by the groups for discussion of the project topic, for making decisions about the allocation of topics between the members and for the coordination and compilation of the project which was handed to me for marking and comments. The groups present their work either to me or to one of the other groups.

C. EVALUATION: Since the Forum there has been a marked increase in students' confidence in their ability to work together in groups; the quality of the projects in terms of coverage, coherence and presentation has shown a steady improvement. The standard of work is incomparably higher than that achieved in earlier years by students on this course.

However this impressionistic evidence cannot suffice. At the end of January, 1983 (about five months after the course had started) I distributed a Questionnaire asking students 3 open-ended questions:

1. What effects do you think this method has had on student/teacher relationships?
2. What advantages do you think this method has had for students' learning?
3. Has there been any change in your attitudes to the group learning method, taking the period from the beginning of the course to the present?

Other comments were invited.

I scaled the responses to the questionnaire and compared the results with those obtained earlier from the ballot. I was able to sort both sets of responses into groups. At the time of writing I have only received responses from 4 of the groups so the analysis rests on this sample.

Two groups show a high level of consistency when the responses to the two questionnaires are compared. However, two groups show a marked change; one from negative attitudes to overwhelmingly positive ones, and the fourth group from very positive to negative.*

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*I may have been studying the group at an early stage in its development.

Although my measuring techniques have so far been ad hoc, the results are compatible with my knowledge of the students and the individual groups. They provide a basis for the generation of theory and raise interesting problems for methodology.

D. THEORY AND METHODOLOGY:

Although this project was designed to produce a solution to a problem rather than to generate theory or rigorous data, what information I have collected supports the informal impressions gained from continuous contact with the students. The questionnaire was answered with astonishing frankness. Only a reading of the responses can lead to an appreciation of the richness of data obtained by this method.

When I embark on a more rigorous research programme, appropriate techniques will have to be developed to measure changes in individuals' attitudes over time, as well as changes in group processes.

However a methodology must precede both the formulation of hypotheses and decisions about research methods. It is useful to start the research process by defining the levels of analysis from which such a study could proceed.

A Methodology for the study of Group Learning.

I will define those levels of analysis from which I believe such a study could proceed.

EXTERNAL ENVIRONMENT:

This could include any factors external to the group, but in this case the educational culture into which students have been socialized in schools will be taken as the most salient feature of this 'external environment'. THe characteristics of this dominant educational culture are maintained and reinforced within the Polytechnic in the first-year of under-graduate Business Studies.

The 'culture' is here defined as the 'taken-for-granted' assumptions which students hold about what constitutes learning and their expectations of teaching/learning situations. I agree with Illich who, in 'Deschooling Society', characterises schools as favouring the development of passivity and dependence. Students are habituated to accept an authority structure where teachers give orders and pupils are expected to obey; where students have little control over the curriculum and hence derive little intrinsic satisfaction from their work, which tends to be oriented towards longer-term instrumental goals. However, one could not argue a case for changing teaching methods if one believed that the effects of such 'conditioning' are permanent! The Learning Programme has already indicated that, despite its power, this 'cultural effect' can be modified, though not without some 'pain'.

If given the opportunity to examine their 'taken -for-granted' assumptions in a participative, student-centred learning situation, students can develop alternative conceptions of what constitutes 'learning' and modify their learning strategies accordingly.

However, building up acceptance of alternative structures and concepts when long-held models and beliefs are challenged is not easy.

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THE GROUP : Gibbs(1981) maintains that a group is a 'social construction not a thing in itself'. The responses to the questionnaire (Jan. 1983) give support to this phenomenological position. However, if groups are conceived of dynamically, viz. in the framework of some model of group development, then one can treat 'group' properties as emergent.

Tuckman (1965) provides a testable hypothesis which identifies four sequential phases of group development. However, he ignores the possibility that 'the mere maintenance of the group (may) constitute a problem in and of itself'.(Collins & Guetzkow, 1964).

The problem for research is whether or not, as Gibbs suggests, each group is a unique outcome of the interaction between its members, or whether, as Tuckman proposes, generalizations can be made about group developmental processes.

In a naturalistic setting groups cannot be systematically observed, this kind of study, therefore, presents a challenge to the researcher. As Fraser points out (Tajfel & Fraser, 1978) a gap exists in the social-psychological literature of groups studied in naturalistic settings. Very little work has been done on group development in either laboratory or naturalistic settings.

Tuckman's model of group development is appealing as a hypothetical basis for this project as he relates the stages of group development to groups' strategies and effectiveness in managing tasks.

THE INDIVIDUAL: The responses to the Questionnaire indicated that in January 1983 group members had discrepant perceptions of the membership group and its activities. In order to test the validity of two conflicting hypothetical models i.e. Gibbs' model of a group as a social construction, and Tuckman's view of a group as a dynamic process evolving through 4 clearly defined stages, changes in individuals' perceptions of membership groups could be monitored over time to see whether any evidence emerges to sustain Tuckman's claims.

Collins and Guetzkow define each group as a unique outcome of the interaction between its members and concentrate their attention on the individual group member,and on those'stimuli' which impinge upon him/her. The model identifies two categories of stimuli for investigation

1)stimuli external to the group, and

2) stimuli internal to the group, in particular the behaviour and presence of other members. It emphasizes that 'the mere presence of other group members often presents greater obstacles in the way of task accomplishment than do obstacles associated with the task itself'.

....

The task of discovering these obstacles remains to be done. However, I am not embarking on a more rigorous research programme in the hope that once these obstacles have been identified that all problems and difficulties can be predicted and resolved. The human spirit exerts its own power over 'social forces' and, I believe, it is the task of the social scientist to understand rather than to manipulate human behaviour.

Some additional questions which will need special attention in a further research programme are:

1. to relate the levels of resistance and negativity to the stage in their developmental cycle reached by people in their late teens. The dominant culture encourages a dependent relationship between teacher and student; it may be that the reluctance of some students to accept more responsibility and control may be related to the general maturational problem of coping with the transition from teenage status to adulthood.
2. further, resistance and negativity should be investigated in relation to students' perceptions of the salience of Behavioural Sciences to their vocational aspirations.

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A SPECIFICATION FOR THE ASSESSMENT OF THE LABORATORY SKILLS OF SCIENCE TECHNICIANS

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Over the last fifteen years it has not been difficult to find writers on assessment who are concerned with marker reliability and its implications for grading, with how to produce better multiple-choice items or how to handle results statistically. It is much less easy to find writers who offer practical advice, with a minimum of technical jargon, on the construction and use of a variety of assessment instruments. What literature there is in this area is mainly concerned with assessment methods based on the written work of students. These range from open-ended questions (essays) through highly structured written tests to short answer questions and objective items. Little discussion has taken place on the instruments and techniques which might be appropriate for the measurement of attainment in practical work.

Many examining authorities(e.g. NCEA (Republic of Ireland), TEC (U.K.) and Nuffield (U.K.))require that the practical work of students be assessed throughout a programme of laboratory instruction. While this is a significant advance on the traditional end-of-course practical examination, which was justifiably criticised on the grounds of poor validity and poor reliability, the criticism that assessment is excessively based on the written reports of students may be equally valid for many schemes of continuous assessment. As Heywood (1977, p.85) has pointed out, the fact that it is the written report rather than the practical activity which comes to be assessed may well explain why many investigations record a high correlation between theory and "practical" examinations. Furthermore, the research of Buckley and Kempa (1971) showed a correlation of only 0.25 between the marks awarded on the basis of reports and marks awarded on the basis of a direct observation of students' performance in the laboratory.

Practical work is assessed because it is important to the particular subject and because it would be unrealistic to provide for a student any form of certification of ability or achievement in the subject without including its assessment. A good system of assessment would encourage students to work at precisely what is important in a course. It is hoped that the argument for "an objectives approach" in technician education can be presented here without the off-putting intensity exhibited by many of its over-enthusiastic advocates. The rhetoric of precise instructional objectives, where used to represent an instructional programme's rigour without specifying measures to assess student attainment, is no more than "up-front verbal precision", to use Popham's (1975) phrase. In technician education there is frequently a mismatch between the stated objectives for laboratory work and the focus of assessment.

The specification of the objectives of practical programmes is not an esoteric exercise which researchers engage in; on the contrary, it is an intensely practical and realistic activity which can only be properly undertaken by practicing teachers. It is important that the full range of skills and abilities are adequately covered. Otherwise, practical programmes may lack balance in having too much emphasis on a limited range of skills.

MOPIA

It was decided to group objectives under five principal headings: manipulative skill (M), skill in observation and recording (O), ability to plan and carry out experiments (P), knowledge, analysis and interpretation (I) and attitudes to practical work (A). This was done to facilitate course planning, analysis and record-keeping. It should be emphasized, however, that these are general "umbrella" headings and that the objectives of each practical exercise are always stated explicitly so that criteria for their assessment can be derived. These main headings form the operational divisions for analysis and assessment and the system is referred to as *MOPIA*.

A complete specification for the assessment of practical work should contain the following four components:

(i) *an analysis* relating the abilities and skills to be assessed to the content of the practical programme;

(ii) an *assessment plan* outlining the methods and techniques proposed for assessing the course, these being related to the assessment analysis;

(iii) *the criteria by which marks are awarded* for the skills and abilities assessed;

(iv) *the records to be* maintained.

The analysis of a practical programme for assessment purposes was undertaken using the framework shown in *figure 1* which employs the *MOPIA* system for grouping objectives.

Fig. 1: ASSESSMENT ANALYSIS: SUMMARY OF PRACTICAL WORK USED FOR CONTINUOUS ASSESSMENT PURPOSES

A tick should be placed in the appropriate box against each exercise indicating the general skill to be assessed.

Practical work used for assessment	Date	Skills assessed on the experiment				
		M	O	P	I	A
1.	29/9/82					
2.	12/10/82					
3.	19/10/82					
4.						

An assessment analysis is not only helpful in planning assessments but is fundamental to the whole curriculum development process. Any imbalance in a practical programme will be highlighted by the analysis. Changes may then be made in the content or structure of the practical exercises.

The mix of assessment techniques used was determined by the need to assess the skills set out in the assessment analysis. The resultant assessment plan (table 1.) has two broad categories:

(a) Learning experience assessments

Here, the most important assessment technique was the direct observation of students at work. For the most part, as many students as possible were assessed on a single ability while a practical session was in progress. Occasionally, it was possible to monitor attitudes to safety (A), for example, in addition to manipulative skill (M) (e.g. in apparatus assembly and operation.) The number of practical exercises used for assessment purposes will vary from courses to course. It is important, however, that each student be assessed sufficiently on each general skill area.

Table 1: SAMPLE ASSESSMENT PLAN indicating the methods adopted in assessing a student's practical work and the approximate weightings assigned to each assessment technique.

Direct Observation (incl. oral questioning) 30 - 35%	3 "Assessment" Practicals 36%
Written Work (reports, results sheets, etc.) 15 - 20%	3 Written Tests - 45 min. (4% + 5% + 5%) 14%
% of Total Marks 50%	% of Total Marks 50%

In addition to allocating marks on the basis of observations made while students worked in the laboratory, skills in recording, observation, reporting and interpretation can be assessed using the students' written reports of their practical work. Structured results sheets may be used when there is little need for a discussion (interpretation?) of results. If the written reports of students are to have much validity for assessment purposes, students must be given time to complete their reports at the end of the laboratory period to which they relate.

Oral questioning and discussion should be routinely used as an additional check on judgements made while observing students at work in the laboratory. The opportunity afforded by oral discussion to justify a proposed course of action or to explain the basis of conclusions reached is of considerable value when assessing many of the skills which practical courses aim to develop in students.

The marks allocated for all learning experience assessments are recorded on individual student record cards.

(b) Special assessments

These special exercises or tests conducted to sample learning were of two types:

(i) special "assessment" practicals which were carried out under examination conditions. Assessment of student performance on these practicals was based on direct observation and oral questioning during the practical, on results (i.e. materials, apparatus or data produced) and on marks awarded for a brief report.

(ii) written tests held at selected intervals during the course.

These were held three times annually during the period normally reserved for a one-hour tutorial on the day following the laboratory session. They were designed to assess knowledge and comprehension of principles and techniques and the ability to make mathematical computations and to interpret data.

The Criteria for the Award of Marks

Specific criteria relating to the five categories (M, O, P, I and A) were developed with respect to the abilities or skills to be assessed during a particular practical exercise. A short mark scale (1-10) was used with criteria usually specified in terms of ranges of two marks (9-10, 7-8, etc.). The extent to which distinctive criteria can be clearly indicated has a major bearing on the ease with which assessments are made. "Mastery criteria" might be applied in the case of the special "assessment" practicals.

The Recording of Assessments

The maintenance of appropriate records is an important aspect of any continuous assessment programme. A record card for each individual student is essential. This must be kept up to date as the course progresses. A final mark in each of the skill categories, M, O, P, I and A is obtained by taking the average of the individual marks awarded on the seperate assessment occasions. An overall mark for each student is obtained by summing the final mark in each of the five skill categories. A specimen summary card for an assessment set showing the overall marks awarded for learning experience assessments is shown in figure 2.

Regular feedback to students on their performance in the laboratory is important. When the end-of-term mark arrives the student can always remember the one "good" experiment where all the colour changes came on schedule, the synthesis worked to perfection and all the special ground glass equipment was returned undamaged. His memory may be at a loss, however, to recall a lack of activity in an enzyme preparation, low yields in a chemical synthesis or a failure to follow simple instructions. The best feedback is verbal with reinforcement by written comment on student notebooks and reports.

Figure 2: SUMMARY CARD

The assessment of practical skills in ..Applied Biochemistry.......

Name of College..Budlin College........... No. of candidates 24

Candidates Names	Assessment (1-10) for each ability					Sum of assessments for abilities M-A(Max. 50)	Refer to Comment
	M	O	P	I	A		
Boyle, Robert							
Cavendish, Henry							
Crick, Francis							
Darwin, Char ...							

Notes made when assessing by direct observation can also be used for feedback purposes. The realization that "he remembered" poor planning or untidiness of approach comes as something of a surprise to many students. Past experience may have led them to expect that the marks awarded will always hinge on a "good" report, which might, as a result, be prepared with one eye on assessment.

The assessment specification outlined above is derived from a study which involved a questionnaire-based enquiry among staff in the Regional Technical Colleges in Ireland and a detailed analysis of the characteristics of representative examination results. An important consideration in its evaluation should be the extent to which it provides solutions to some of the main problems highlighted by both the questionnaire and the results analysis.

Specific guidelines are offered here which would lead to greater consistency in assessment (over ninety percent of questionnaire respondents indicated dissatisfaction with occasional informal efforts to achieve greater consistency in the assessment of practical work). A greater range of assessment techniques are employed than heretofore, thereby rectifying one of the shortcomings of many assessment procedures; i.e. their over-dependence on the written reports of students for assessment purposes.

A considerable amount of course re-design may be necessary before this scheme can be implemented. The programming of students must be reduced if many of the desirable outcomes of practical work are to be achieved. Too many practical exercises as currently set out develop only manipulative, observational and, to some extent, interpretative skills. Finally, since the assessment of practical work is designed to elicit information on skills which may be distinct from those assessed in tests of theoretical ability this information should not be partially hidden by producing a composite mark. A simple two-dimensional profile would be a significant improvement on the single unidimensional grade which is currently employed.

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THE DESIGN PROCESS AS AN EXPERIENCE IN CRITICAL THINKING

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Introduction

One person's 'critical thinking' may be another's 'design process'. The design process and the process of critical thinking may be differentiated most readily by their goals. In one case it is a product or a solution. In the other case it is evaluation and/or expansion. Other than that difference, the experiences may be viewed as equivalent. The engineering design course at UWM directs each student through the design experience toward a goal that he or she defines. The result is the development of an individual who is prepared to look at problems in their broadest terms. Only recently have engineering faculties viewed 'design' as a discipline deserving of courses of its own. The University of Wisconsin--Milwaukee, College of Engineering and Applied Science, has developed such a course with considerable success. The following pages discuss the course content, orientation, environment, format and approach.

Let's Compare Some Systems

Critical thinking often prowls the world disguised under other names. Right or wrong it is sometimes called scientific thinking, reflective thinking, reflection, productive thinking, or even ratiocination. In colleges of engineering it most often lives under the name 'The Design Process'. Ultimately, regardless of the name by which the system is called, it has the same goal which might be defined by a phrase such as "to have the mind turned toward careful analysis and judgment." For the engineer and scientist, of course, it carries the additional requirement to develop solutions, systems or products.

The UWM College of Engineering and Applied Science undertook to develop a course that applies the design process in a truly open-ended problem situation. Many work hours have been spent in the design of a course to encourage the student to avoid some of the pitfalls of linear thinking, such as premature decisions, ignoring contrary evidence, careless collection of information, and approaching problems with personal prejudice. The students must also be aware that, in the real world of engineering and most professions, they will never have all of the facts and will at the same time be deluged with extraneous data. All of the steps in the course involve the student in decision making, evaluation and criticism from the stage when the problem is first defined.

It is common to define the scientific process in terms of problem identification, generation of alternatives, hypothesis, intuition and so on. In many cases the difference between these various systems is only that of standard terminology. Generation of alternatives, for example, is often called ideation by people interested in creativity.

There's an old definition of the oboe that describes it as "an ill wind that nobody blows good." One of the temptations that an engineer has in looking at the activities of people who 'teach critical thinking' is to develop a parallel definition that says "critical thinking is a productive process that nobody thinks about." The review of a quantity of literature made it apparent that no definition of critical thinking was readily available. Thus it became necessary to contact a few colleagues. The first one, of course, said that he definitely did teach critical thinking. He was, however, unable to define it. A second one who said, "Oh, yes! We teach critical thinking in this department." Ultimately he said that he would get back to us and later provided a definition from John Dewey that says:

> Active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it, and the further conclusions to which it tends, constitute reflective thinking.

Perhaps the two preliminary comments simply indicated a poor choice of reference, so a colleague in another department was approached. After a few 'hmms' and 'errrs' he said that he'd get back to us with a definition because the Philosophy Department teaches critical thinking all the time. To this date there has been no response. Perhaps I. A. Richards is the source that is most pertinent here. He said:

> Thinking--in the sense of a thorough attempt to compare all the aspects of an object or situation, to analyse its parts, to reconcile one with another all its various implications, to order it in one coherent intellectual fabric with everything else we know about everything connected with it--is an arduous and not immediately profitable occupation. Accordingly, outside the scientific professions and endowed institutions and even within them, it is much less practised than we conventionally suppose.

The most likely definitions to consider are, perhaps, those from the dictionary:

> Thinking--to form or have in mind; to conceive; to have the mind turned steadily toward.
>
> Critical--characterized by careful analysis or judgment; point of change of character, property or condition; or critics or criticism.

At the last minute before the paper deadline this definition as well as those related to design, was supported by a response from the English Department. A long discussion was ultimately summarized with the sentence:

> In essence, then, critical thinking is mental activity that interprets data, applies facts and principles and that is regulated by logic and judgment.

Overall, the statement paralleled, almost exactly, the design procedure of problem recognition, collection of data, generation of alternatives, evaluation and recommendation.

A Concise Look at the Course

Past years have brought a growing recognition, among engineering educators, of the need for a 'real world' design experience for the enigneering student. In most sections each student is given the freedom to select a problem of interest to him or herself from the real world--from hobbies, from work situations or simply a problem that has been observed. At UWM a course entitled "Introduction to Design Techniques" is taught at the freshman level. It is required of all engineering students. Most students, for the first time in their lives, are introduced to the open-ended problem where there is no one correct answer but there are many answers. In many cases, the student is asked to work on his own in an area with which he has only a minimum acquaintance. The course is broken up primarily into three major areas from a time standpoint.

A feasibility study is done on an individual basis. Each student defines the problem on which he will work and then goes on to develop alternative solutions and judgment criteria. During this phase of the course the student is introduced to the topics of problem definition and techniques for creativity. He or she is asked to apply writing, sketch, and research skills previously developed in other courses. He evaluates the solution and recommends one for continuation. The designer also has the option of recommending noncontinuation or of recommending that the project continue with additional refinement of either the criteria or design to be done. The emphasis in the feasibility study is based on the conceptualization and the development of ideas. The designer presents the concept to the class orally. The class group then serves as an evaluation team to select the better projects to go on to the developmental and detail design phases.

At the end of the feasibilty study the number of projects in any given section is reduced to approximately one-fifth of their original number. From that point on the only real decision that most instructors make deals with the quality of the feasibility study. The written report must support the oral presentation. Those projects which have been selected by the class and have obviously been well developed by the student then go on into the developmental design phase. In an industrial atmosphere four to six students are assigned the job of optimization of the project.

The teams formed, based on student interest, learn to design together, plan, lead and produce. The emphasis during the developmental design phase is on the "hardening" and optimization of the design. The team refines the problem definitions, goals, evaluation criteria and the previous solution. Students are exposed to leadership techniques and have an experience in group dynamics. They learn to schedule manpower and evaluate the students with whom they work.

The detail design phase is, as in industry, a preparation of the project for construction or production. Individual parts are detailed, assembly procedures are delineated, operating instructions are written and part of the team develops a model of the design. A report from the team comes in at the completion of the detail design phase and with it the model of the design. In addition to the report and model, each group presents an oral report.

Evaluation of the Course

Success in the development of a course cannot generally be established by its student ratings. While these have been good, as a rule, the more important responses came from a group of students and graduates who reviewed the engineering curriculum at a college retreat. Seniors spoke very favorably about the course and members of the engineering faculty who did their undergraduate work at UWM strongly supported continuing development of the program.

One of the ways to evaluate the course is in its applications. Undergraduate projects are sent, annually, to the Student Design Competition sponsored by the American Society for Engineering Education. Over several years, UWM had more winning projects than any other school in competition. Related to this is the fact that students involved in industry-team design projects and other competitions almost always return to the thought process and steps to which they were introduced in this course. Industrial engineering faculty have been invited to present workshops on other campuses and at professional meetings.

Another interesting point to observe is the number of non-engineers who enroll in an introductory course on design techniques as an elective. In some instances team taught and concurrent courses were offered between the Industrial Engineering Department and the Art Department. The important interface was the use of the design process.

The experience of members of the Industrial and Systems Engineering Department clearly indicates that this form of critical thinking or design process is of great value to the variety of students who enroll in the course and work together in design teams. Only through the deliberate and thoughtful development and control of the course, however, can such a project be successful.

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Paper to be presented on the Ninth International Conference on

IMPROVING UNIVERSITY TEACHING

AN EXPERIMENTAL AUDIOVISUAL TRAINING IN PERCEPTUAL SKILLS OF MEDICAL STUDENTS

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Introduction.

A continuing retrenchment-policy in the whole field of Dutch scientific education is leading up, at present, to a climate of far-reaching educational innovation at the universities. In this context of curriculum innovation the Medical Faculty at Nijmegen is making an assessment and evaluation of all teaching activities in which interpersonal skills (hereafter to be called IPS.), both social and medical, are acquired by students, like getting an anamnesis, doing palpation or giving bad news to a patient.

Concerning the teaching of IPS in U.S. Medical Schools, Kahn, Cohen and Jason (1) point out a lack of coherence in various teaching activities. Carroll and Monroe (2) explicitly plead for a continuity throughout preclinical and clinical years of study in the training of IPS. Likewise Dutch medical education needs a stronger coherence in the teaching of such skills.

The main objective of the Nijmegen project is the development of a coherent system of programs of skills-training, consistently building upon each other all through medical training. Both by designing new programs and by revising existing courses an attempt is being made to bring about such a system.

A preclinical course was developed in which large groups of second-year-students are trained by a minimum of staff in basic skills needed to obtain the anamnesis from a patient. An existing post-graduate course for physicians (3), developed on the initiative of Hoffman-La Roche B.V., was used as basic material. A first experimental set-up of the course was aimed at finding out if such a program is a realistic approach and an adequate start for a series of training activities in IPS of a systematic order and coherence throughout the medical curriculum.

Basic Notions

In the education of a physician various learning processes take place. One of these processes is a continuous transmission of knowledge and skills, which are considered basic in the training of every physician and are usually stated in the form of educational objectives.

Learning is also carried out by a shaping process which integrates the vocational role of the physician with the personality of the student. Although it is seldom explicitly formulated as an objective, this learning process, in which the acquiring of attitudes is a most important aspect, is essential in medical education. In preclinical as well as in clinical teaching, both in lecture-rooms and in clinical wards, teachers function as models for students. Learning is, to a considerable degree based on identification processes. This is one of the reasons why contributions of behavioural sciences to the medical curriculum are seldom effective, as Begun and Rieker (4)

point out. They advise interdisciplinary teaching teams that are able to link behavioural science-input to medical performance.
The experimental course, described herein, aims at presenting an integrative approach from the start in preclinical skills-training. Both in course-content and in forming a staff, a synthesis of medical and behavioural scientific aspects had to be expressed.
A second related notion concerns the teacher/student-ratio. Because students inevitably identify themselves with teaching physicians in the learning process, personal communication especially between the medical staff and students is important. With the prospect of continuous cuts in available means and stabilized numbers of students, however, newly designed programs should require a minimal investment in teaching manpower. Therefore the use of individualized and sometimes computerized instructional methods is generally increasing.
In this case a program-concept was chosen in which both elements could be saved: personal communication between students and teachers, and an attractive staff/student-ratio.

Concept of the course.

As all human interaction doctor/patient-communication is an extremely complex process. Three elementary subprocesses, carried out by each partner, can be distinguished: perception of the other person, perception of the self and the response. These processes sometimes alternate, at other times take place simultaneously, but always are strongly interrelated.
Perception of the other person occurs visually, auditively and by touch. The physician receives all kinds of visual signals, providing information about the patient as a person, such as physical characteristics (whether or not related to the patient's complaints), feelings about the complaints, feelings about the relationship with

the physician, etc.

Auditive signals make a second field of perception. Besides verbal information (what has the patient to tell ?) paraverbal information (how is the patient talking ?) is offered to the physician. Often paraverbal signals, as sentence-structure, breathing, loudness of voice and intonation, have great informational value with regard to patient's experiencing, both the pattern of complaints and the relationship with the physician. Sometimes the way of speaking, e.g. hoarseness of voice, directly indicates physical complaints.

The literature about teaching IPS seldom gives explicit attention to self-perception as an integral part of interpersonal processes. Kahn, Cohen and Jason report in their review (1) that 'being aware of self' is attended to in 80 % and 'assessing self' in 65 % of the teaching programs in IPS in U.S. Medical Schools. Authors, however, who do incorporate the experiencing of the self into the diagnostic instrumentarium are generally psycho-analytically oriented (see e.g. Balint (5), Reik (6)).

In interaction, self-perception is a potentially rich source of information. The own body, the inner world of thought and feeling, and especially momentary fluctuations in it, should be considered as channels through which many relevant signals are offered. Some examples:

physically: heart palpitations, moist hands, quickened breathing, heavy feelings in stomach or belly, eructations, restless motion, etc.;
cognitively: emerging ideas, associations, hypothesis, fantasies, etc.;
emotionally: tension, fatigue, pity, aggression, sexual arousal, flight tendencies, etc.

What the patient evokes in the physician may give primarily information about the relational ability of the patient. Secondly, self-perception may offer indications about the quality of the doctor/patient-relationship itself. Thirdly, by means of self-perception one can recognize selectivity in perception, that is to say, by getting to know one's preoccupations, its effects might be more consciously regulated. Finally, self-perception may lead to an awareness of signals which the physician, often unconsciously, does send out to the patient, i.e. a quick glance at the watch, nervous vibrations in hands, lips or eyes. These signals inevitably have their effects on the patient.

The third process, which earlier was called response, includes all visable reactions, verbal or non-verbal, by the physician. In this course there is hardly any attention given to what the student would or should do, as a reaction to the patient. It will be a central subject in subsequent courses. In this one the core lies in perception, both of the other person and of the self.

In summary, perception of the other person and perception of the self are considered basic skills in this course in IPS. Variables which are often considered troublesome in the anamnesis-interview (selective perception, effect of one's own emotions, etc.) are exploited as valuable informational sources. The course aims at systematically exploring and expanding the channels of information which are usable by the physician in obtaining an anamnesis.

In this basic concept exploring one's own individuality as it manifests itself in interaction processes, is the focussing point. It is hypothesized that explicit attention to specific individual aspects of a person necessarily precedes further development of empathic skills. Relating to this the article of Kaus et.al. (7) is interesting. They report that even the more encompassing training-programs in IPS have only a limited effect: an increased use by students of open-end-questions and more emotion-directed questioning. In the long run, however, empathy as a skill remains at roughly the same level.

Diseker and Michielutte (8) report comparable data.
Systematic tranning in exploring the self during interaction may give way to effective training in empathy.

Course.

The design of the course requires a team of three teachers, from the medical and behavioural disciplines, training maximally eighty students in perceptual skills simultaneously. It takes place in one large hall during five sessions of three hours, preferably during one week.
The first three sessions provide training on three types of perception: vision, audition and self-perception. The fourth session aims at an integration of using various perceptual channels. These four sessions are composed of a series of exercises with the broad goals of: assessment and development of individual perceptual ability. The fifth session is of a more demonstrative character.
Exercises are designed according to a basic procedure:

- o viewing of videotaped fragments of doctor/patient-communication of various lenghts, from a few seconds to five minutes;
  In exercises on visual perception sound is excluded; auditory perception is exercised by listening to sound only, without the videoscenes. Exercises in self-perception sometimes present only sound; sometimes only the pictural presentation takes place without sound; and at other times both sound and scenes are presented.
- o individual noting down of observations;
- o sharing and discussion of observations in groups of ten students without members of the staff.

Sharing implies confrontation of one's perceptual ability with others, which, if frequently done, leads to an exploration of one's perceptual apparatus and one's primary inner reactions, cognitively and emotionally. All this is of an individual and therefore unique quality. The often repeated elicitation of a great variety of observations among individuals observing identical stimuli, leads to an awareness of the subjective quality of perception.

The four exercise sessions are uniformly structured and consist of:

- a short exercise introducing the subject and procedure of the session; e.g. to introduce visual perception five short videofragments of various doctor/patient-interactions are presented without sound. Each fragment is followed by individual noting down of observations and sharing of observations in a small group;
- theoretical input relating the session-theme to the setting of the doctor/patient-interview in which anamnesis is obtained;
- exercising on two longer videofragments according to the given basic procedure;
- summary of the main aspects raised during the session.

At the fifth session a series of salient moments from earlier presented videomaterial is shown, demonstrating a high informative quality of visual and auditive, including paraverbal, signals.

In addition, a few exemples of adequate reactions by a physician are shown, which were based on accurate perception of the patient and on self-perception.

Videomaterial was carefully selected from a large file of recorded real-life doctor/patient-interviews.

The course requires a specific and complicated physical arrangement. The participating group is divided into subgroups of ten students. Arrangements should permanently make possible:

- students talking to eachother with a minimal level of noise from other subgroups; subgroups should be spatially arranged making possible intimacy within subgroups;
- eyecontact between staff and students.

All this requires a hall, large enough and of an outstanding acoustic quality.

Video-arrangement is as follows: each subgroup has its own TV-monitor on which videomaterial is presented. The staff has a videocassetterecorder from which central presentation of one video-fragment to all subgroup-monitors is possible. The staff can make their choice between isolated sound-presentation, isolated pictural presentation, sound and pictures simultaneously presented, static or moving pictural presentation, etc.
To facilitate sharing of observations each group has its flip-chart.

Evaluation.

The described course was experimentally given once with five groups of ten students each of the second preclinical year. The program was offered in addition to the regular curriculum; participation was therefore voluntary.
The evaluation was set up in a modest way. The most important objective was to obtain information about how the course was experienced by the participating students. Evaluative data would be used to decide about repeating the course on a larger scale with eighty students and eventually about making the course a regular part of the curriculum.
Evaluation was done by constructing and administering a questionnaire. Both participating students and staff were extremely satisfied with the program as a whole. Students called it: instructive, enriching, usefull, practical. For some is was somewhat superficial.
The way interdisciplinary cooperation was realized, was judged extremely positive both by staff and students.

The labour-intensive process of designing the course turned out to be the base for a satisfying presentation of the program, in which medical and behavioural scientific aspects were linked closely.
In sharing this program with other teachers it seems a precondition to pay explicit attention to the building of a good team.
Earlier a strong coherence was mentioned of the three processes in human interaction: perception of the other person, self-perception and response. In this course much attention was paid to the perception of signals, either sent out by the other person or by the inner self during interaction. Response was almost continually neglected.
It is exactly because of this intensive interrelation, that ignoring one of these three processes evokes tension on the side of the students.
Evaluation of this course made clear that in subsequent programs ample room should be given to response and taking action by the physician.
However, in these courses a continuation of training in perception and self-perception should take place also.

Conclusion.

It may be recalled that the course was designed on the following terms:
- integration of medical and behavioural scientific input;
- a low staff/student-ratio;
- [illegible] an engendering of maximum personal communication between staff and students.

This course, designed with these conditions in mind, seems a satisfactory basic program in IPS for second-year preclinical students.
Secondly, it may be stated that in this way a good start has been made in developing a coherent series of training programs throughout the medical curriculum, in which students are taught how to deal with medical diagnosis and social skills in an integrative way.

By placing this initiative in an early stage of medical training (the second year) and by emphasizing the assessment of individual perceptual ability, students acquire interpersonal skills in an individualized way.

The effectiveness of the course in teaching the students IPS was not properly assessed. Evaluation research is needed to obtain valid information about effects.

It was suggested that, to make the training of medical students in empathic skills effective, it might help to do some training in perceptual and, especially, self-perceptual skills first. This hypothesis should be tested empirically.

Finally, the results of this pilot study give sufficient cause to continue the innovation-process of the teaching of IPS in the medical curriculum.

Recently, a microlab was offered to about thirty staff members and administrators of departments involved in the innovation project. This shortened course, taking only three hours, consisted of a series of exercises in perception and self-perception, build up in roughly the same order as in the experimental course. It was presented as a promotion activity and problably caused a quick positive decision about making this new program a definite part of the medical curriculum.

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PLANNING FOR THE CLASS OF 2000

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One obvious advantage of addressing the Class of 2000 is that it is not some mythical group. They are already here. They were born in 1978. In fact, they will start kindergarten next year. We already know quite a bit about them. We know for example their life expectancy (86-94 years); we have a fairly firm notion of the distribution of males and females (46%-54%); how many will be white, black, Latino, etc.; we know what percentage of them will go to college (46%), etc. Another attractive advantage of focusing on the Class of 2000 is that since many institutions already are so uncertain or confused as to what they should become in the future; focusing on the Class of 2000 may provide just that sense of direction and specificity that colleges and universities need now. Certainly, some set of future defined values is essential in any discussion of what to change and what to affirm. In short, what I am arguing is that long-range considerations return to higher education the sense and ballast of history, although curiously the history of the future.

But lest the focus become escapist all long-range plans have to be incarnated in a series of short-term plans, each one like a series of stepping stones from the present to the future. The advantage of long-range speculation is that it identifies in comprehensive terms what we should like to be. Between now and that point there are many intermediate positions that are available; but not all of them are the most optimum stepping stones to all goals. Having the goals guides the selection of which ones are best. In other words, long-term planning provides us with the strategy of options. To keep that strategic process central in this discussion, what I propose to do is to identify five general areas that will shape and define our graduates in the year 2000; and then to outline the various kinds of strategies needed to get us there in stages.

1. Perhaps the most obvious perspective future graduates will have to have is a global one. I use the term global rather than international because the two are not the same; global is the futuristic version of international. I would date the global perspective from the time when the earth was first perceived holistically as a planet from the vantage point of outer space. A global perspective is an impinging perspective, a sense of collective pressure that diminishes isolationism. It also means that the measure of a country will be its global stature and difference. Indeed, the U.S. may not be a world power by the year 2000. Japan may be or Japan in economic alliance with China may. In addition, there is the interesting possibility that ideology alone will not be the sole determinant of interesting world order models. Thus, Japan is not only successful but also interesting. Switzerland has been for years; so is Israel. France may be weaving its own version of Japan, Inc.; and if the amalgam of banks, government and business works the ideologies of capitalism and socialism may once again become surprising bedfellows. Indeed, the emerging academic field of World Order studies already has suggested that Japan and France are countries modeled on multi-national corporations who in turn by the year 2000 may be the super powers of the world. In any case, what future graduates will gradually become aware of is the doubleness of their allegiance; they will need to be citizens of their own country and global citizens as well. What undoubtedly will intensify the status of global citizenry will be the increased significance of outer space exploration and involvement. But to foresee the need for greater knowledge of our "globality" is by no means synonomous with our being there. *As President Carter's commission on the state of knowledge of foreign languages and cultures plainly indicated, institutions of higher education have a long way to go before G.E. (General Education) courses can stand for global education. Clearly, a major policy issue for higher education is planning for global citizenry.

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*See Humphrey Tonkin and Jane Edwards. The World in the Curriculum: Curricular Strategies for the 21st Century (New Rochelle, 1981).

The most obvious first strategy in achieving global consciousness is to reintroduce the requirement of foreign languages. The President's Commission, the book on The Tongue Tied American, some embarrassing incidents of translation abroad, etc. have brought sufficient publicity to the cause but the passion of indignation must take specific and pragmatic forms. A few colleges and universities have revised their general education requirements to make them more traditional and in the process resanctioned foreign language study. If that is not immediately possible--and throughout higher education that seems to be the case--then the stage prior to requirement should be that of recommendation. Faculty and administrators should be vigilant; every course proposal that comes along or new program that would obviously or subtly benefit from foreign language study should recommend taking foreign languages. This is increasingly true of business programs which are involved in any multi-national operations. In fact, multi-lingual requirements as part of overseas job descriptions are becoming increasingly familiar.

Support for global citizenry is also coming from the increasing number of American students studying abroad for a summer, semester or year. Clearly whenever such programs exist they should be supported by faculty and administrators; and where they don't, there are many international consortia colleges and universities can join. The reverse pattern of foreign students coming here is equally important to encourage. The current estimate is that nearly one million foreign students will come to the United States during the decade of the 80's for higher education.

2. Integral to global education is interdependence which finds its academic equivalent in what can be called the knowledge of interdependence. For many, that means systems dynamics or cybernetics which argues that the whole is crucial to the knowledge of the parts. Increasingly, the necessity for knowing the interdependence of things is being identified correctly as environmental knowledge. What is beginning to emerge is a comprehensive and precise understanding of the mathematics of interaction (the environmental systems of air, water and food); the art and science of futuristic assessments (the carrying capacity of the earth

in terms of population and natural resources, and the capacity of human systems to generate jobs for a global planet of the young); and the triage economics of fossil fuels and food, their availability and affordability. We know for example that when China explodes an above-ground dirty nuclear weapon, the babies in New Jersey ingest it with their milk. We know that Japan regularly exports the most polluting stages of their steel-making process to the Phillipines who are willing to pay the price of contaminated air in exchange for jobs. Any item of clothing that is made in Korea or Taiwan is part of an economic chain as long and durable and essential as the biological chain of life. The recent meeting of economic ministers from all over the world made it clear that no one nation, not even the United States whose GNP is about 25% of the world's total, is sufficient to stir and sustain global recovery. In short, the truth is that our increasing awareness of the interdependence of things is far from matched by our teaching of that awareness.

The most obvious first strategic step is a review of all current programs to determine which ones if any treat knowledge as an integrated body of information. Where such programs are lacking, there minimally should be advocacy for stop-gap courses that seek to identify some areas of convergence and thus serve as a model for student synthesis. From a negative point of view, we should once and for all cease and desist from ridiculing, to our collective shame, those few academicians who strive for that wider knowledge and refrain from stigmatizing their efforts by dubbing them diffuse or blurred. No better use could be made of the future than to use it to raise our sights and aspire comprehensively to the creation of integrated knowledge programs. A step in the right direction for colleges and universities to emulate occurred recently when the MacArthur Foundation made a grant of 15 million dollars to create the Institute for World Environment and Resources. Based in Washington, that Institute will have as its first President, Professor James Gustave Speth, who already has demonstrated the interdependence of law and society.

Finally, two additional strategies; one involving commitment and costs; the other commitment and concepts. Every faculty member and administrator knows how meaningful interdisciplinary team teaching experiences are for faculty development. But we also know it often costs more to have two or more teachers teaching the same number of students. Thus, if any headway is to be made in this crucial area in the future some costs commitments and some ingenious financial formula constructions will have to be made. The other area is the cybernetics of social and cultural systems. Little has been done toward demonstrating the interlocking nature of social systems and culture systems at least in capitalist countries. One basic reason for this lack is that the experts of those systems are segmented into disciplines whose vested interest is in remaining separate rather than integrated. A crucial strategy for the future would be projects which would "crack open" a social or cultural system to show its interelatedness; and thus begin dialogues between the commonly exposed academic disciplines.

3. No graduate in the year 2000 could afford to be either as ignorant or boastful about technology as our present graduates are. By then especially the symbiotic relationship between humans and machines will have reached such a stage of intimacy that future evolutionary history will be the simultaneous records of the ascent of human beings and their machines. The current science fiction fascination with humans that are really machines dramatizes a relationship that in reality is far subtler and more mysterious. In addition, current graduates are not aware of the extent to which technology is far more innocent and sinister than its ardent defenders and attackers suggest. In particular, the classic partnership identified by Orwell is acquiring greater relevance; namely, the power of the state is determined by the power of technology which serves to insure the power of both. We are irregularly struggling to reach the goal of technological literacy; can you image what a bumpkin a technologically literate person now would be in the year 2000?

To stir the development of technological literacy as a balanced subject area, no better start could be made in my judgment than linking up with science, technology and society programs especially those at Cornell and Lehigh Universities. Both programs are models of keeping technology central to the larger issues of science and society. Schools of education are simulating technological laboraties, some on wheels, that might represent the classroom of the year 2000. Finally, some very precise definitions have to be created to define what technological or even computer literacy would involve currently; and then in 1985; in 1990; in 1995 and in the year 2000. All those projected definitions could always be altered and updated; but at least we would have precise notions of tracking the integration of humans and machines as part of a new evolutionary partnership.

4. The social changes that have come about in the last twenty years as far as minorities and women are concerned evidently are but a rehearsal for what is to come. In many cities the minorites already are in the majority. In many universities the majority of students are women. (They are still what is keeping the Liberal Arts alive.) In fact, in a number of schools there is the possibility that the class of 2000 may be seventy-five percent female (a combination of white and minority women). It also has been projected that by the year 2000 the largest minority in the United States will be Latino. The 1980's already has been labeled the Decade of the Latino; and if all the efforts to put together an alliance between the Cubans, Puerto Ricans and Chicanos succeed even modestly by the year 2000 many of the graduates at the turn of the century will be Latino men and women; and be part of the largest minority voting block in the country. What also seems to be occurring could be described as the melting pot in reverse. Instead of multiplicity melting to produce unity, multiplicity is melting to produce bicultural multiplicity.

The prospect of the United States, especially in certain parts of the country and in many major cities, becoming a miniature of the world requires a more comprehensive approach than that of bilingualism. In Southern California bilingualism means Spanish and English; but in San Francisco it means Chinese and English. Clearly, not all the languages of all minorities can be mastered. The next best step is ESL--English as a Second Language. This methodological tool can be indispensable in establishing basic and even some intermediate understandings between native and non-native speakers. In fact, every bilingual program should incorporate, if it does not already, courses in ESL. Finally, academicians can study in detail what in fact is an action program--the current attempt to create a Latino constituency on a national basis. This movement in fact can become a course or series of courses to study the differences between the cultural assumptions of Puerto Ricans, Cubans and Mexican Americans. Indeed, in the few instances where such courses are being offered, they are substantially populated by Spanish speaking people wishing to learn more about other Spanish speaking people. The same can be done for many Oriental and Middle Eastern populations.

5. Finally, there is the future of learning in general and in particular the future of intelligence. In the last ten years, spurred undoubtedly by work on artificial intelligence on the one hand and the attempt by developing countries to enter the brains race on the other, there has been an exponential amount of research on intelligence or as it has come to be called cognitive science. As one major researcher put it recently: "if we want to develop better ways to learn we should study the organ that does the learning. What doesn't make sense is why it has taken us so long to do so." A research center for intelligence research in East Berlin services most of the Iron Curtain countries. The major project on early physical and mental stimulation of children for the development of intelligence is centered in Venezuela. After visits to that project, heads of state in China and Israel have invited Venezuelan officials to adapt their projects in their respective countries. One of the most obvious and far-reaching yields to come of this global effort is the convergence of physiological and psychological factors so that intelligence development can be enriched by reinforcement. Moreover, these projects, although they start with infants, are revealing patterns that extend into adolescence and young adulthood so that the research is transferable all the way up the developing line. Whether or not

technology may revolutionize the way we teach, the first step is comprehensive knowledge about making people smarter. The point clearly is that every institution of higher education should be involved immediately in a ten year seminar on intelligence development and its applications to creativity, critical analysis, and abstract thought. In the past we were more or less held accountable for how much our students were taught. In the future it may be how smart we have helped them to be.

The basic initial strategy here is infusion. The major efforts for improving and enhancing intelligence have to be identified and made known to faculty. That would include the Human Intelligence Center in Venezuela directed by the Minister for Human Intelligence, Muchado. There is the Human Intelligence Newsletter which regularly features the key international conferences which faculty can attend for further edification. A major effort that has gained significant prominence in England is Reuven Feuerstein's "Instrumental Enrichment Program" which is administered through workshops in the United States by Curriculum Development Associates in Washington, D.C. with Frances Link as the coordinator. Minimally, the human intelligence program should be part of the curriculum of every educational psychology program and part of the staff development programs of every School of Education. It also should be a regular and sustained service offered by Educational Opportunity Programs across the country as well as by all or most Learning Centers. Infusion into the regular faculty and across all disciplines is obviously the key goal but that is only within reach once the above basic strategies have been accomplished.

Clearly, many other future needs could be added but perhaps the case for long-range planning for future graduates has been staked out. But one general problem has not been touched on at all and it is crucial to our future educational function. In some disciplines it appears as if almost everything has changed in the last twenty years. In many disciplines more has changed than not. And yet historically our task has been to be transmitters--of knowledge, of culture, of language, etc. In fact, without such transmissions, each generation would have to start all over each time. But the role of transmission is traditionally contingent on continuity. But change has made continuity an aberration. We are generally more knowledgable about stasis than change, and about before and after, but we are particularly deficient in our understanding of transition, of during. The latter ignorance generally has been predicated on the notion that transition is a temporary mess which we just had to get through. But what we are discovering is that transition is becoming a version of serial change. A transition gives way to another transition and then to another. We are beginning to recognize that there are some transitions that are less turbulent than others and so they give the illusion of stability. In short, what I am suggesting is that one of our key tasks of orienting ourselves to the future has to involve a reevaluation of our role as transmitters and especially of our knowledge of change and transition as it functions and works in all disciplines. Above all, we have to hurry up and start studying the future now if we are to be ready by the year 2000 to teach the present.

COMPUTER MANAGED INSTRUCTION COURSE FOR TUTORIAL SUPPORT

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Introduction:

Since the first intake of students into the National Institute for Higher Education, Dublin, the School of Mathematical Science has arranged tutorial sessions for first year students. These sessions were intended to serve two purposes -

1) to fill in certain gaps between second and third level (bearing in mind that some students have Pass level mathematics at Leaving Certificate while others have Honours level. Also due to selective coverage of the syllabus some topics, eg trigonometry may be omitted altogether).
2) to give the students the necessary experience of 'doing' the mathematics they meet in their first year course.

The conventional tutorial system in first year suffers in the following ways from the numbers involved and time available. Some students

a) are unable to obtain adequate individual instruction for their needs from their tutor. It is just impossible in the time available to provide sufficient personal supervision to those students with major difficulties.

b) cannot work at their own speed - the pace of the tutorials is either too quick or too slow.

c) have not an opportunity to remedy (real or imagined) difficulties in their backgrounds before proceeding to new material.

These factors combine in some cases to produce a feeling of insecurity which result in the student never coming to terms with the material.

The aim of the Computer Managed Instruction Course described below is to supplement the conventional tutorial system and alleviate the problems described.

OBJECTIVES

The objectives of the Computer Managed Instruction (CMI) system are:

1) to provide a bridging course to remedy deficiencies in background,

2) to provide support for the existing tutorial system by concentrating on the core material. Due to the limitations of the system knowledge of the material comprising the CMI system will be necessary but not sufficient to cope competently with their first year studies,

3) to make available in easily accessible form the necessary material for these students who wish to change at the end of their first year from a course with 'low' mathematics content to one with a 'higher' mathematics content.

OUTLINE OF THE CMI SYSTEM

Rather than develop such a system from scratch we are fortunate in having the co-operation of the Vrije Universiteit Brussel (Free University of Brussels) in particular Dr. Francine Gransard, who have developed a system for coping with the remedial (bridging) objective outlined above. They are making their software available to us which we will then adapt to our own needs.

An outline of the system is as follows :-

1) select a topic
2) for this topic write a syllabus for a course covering this topic containing
   (a) the objectives
   (b) the subject matter

3. The subject matter can be presented in several ways
   (a) a free-standing text or lecture notes,
   (b) a reference to a textbook eg one at second level if the topic is of a 'bridging' nature,
   (c) a lecture on video-cassette,
   (d) a programmed instruction (computed-aided learning).

4. The student sits a preliminary test. If passed this indicates that he CMI system has nothing to offer on this topic. Note the pass mark can be quite high. For details of the test structure please see 6.

5. If unsuccessful the student studies the course at his own level.

6. For each topic there would be constructed a number of questions and parallel questions. The questions to be used will probably be of the multiple true-false type with certainty indicator. When ready the student asks the computer to proceed with that topic. The computer then provides the student with a list of question numbers which relate to questions kept in a separate booklet external to the system. This has the important advantage that the system is content free . The system only contains question numbers which could refer to questions in mathematics, physics or accountancy. The student then provides the system with his answers.

7. Based on the answers the student gets learning advice ie diagnostic advice on how best to improve his understanding. The construction of the questions and the diagnostic advice is extremely important. We want, for example, to identify conceptual difficulties and isolate the essentials of the student's difficulties.

COMPUTER FUNCTIONS

The computer has several functions in our instruction system.

1. At student level these are -

    (a) determining the level of students by means of pre-tests
    (b) generating tests
    (c) scoring
    (d) giving advice

2. At instructor level

    (a) itemanalysis
    (b) statistical analysis of results
    (c) evaluation of the tests
    (d) recording administrative date.

We would stress once again the general applicability of such a system described above throughout the curriculum.

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COOPERATION AND CONFLICT IN PLANNING URBAN SCHOOL SYSTEM-UNIVERSITY PROJECTS

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Introduction

Seymour Sarason (1982) has noted that school system-university projects are not simply instances when universities promote change in schools, but occasions of institutional change for both organizations. Using Sarason's observation as a point of departure and the efforts of the University of Massachusetts at Amherst, School of Education, to plan staff development programs with urban school systems throughout Massachusetts as a frame of reference, this paper will examine certain factors responsible for promoting or hindering the planning of school system-university projects. I will draw upon the insights of social scientists who provide phenomenologically informed perspectives on social life (Sarason, 1982; Schutz, 1967; Weick, 1979). These writers argue the importance of examining the taken-for-granted, common-sense view of social actors as a way of describing and making more understandable everyday social activities.

In assessing the possibilities of school system-university cooperation and conflict, I propose that planners may take for granted that they share common reasons for collaborating without examining their goals to see if, in fact, they do. Lacking mutually examined perspectives, planners may find themselves unable to clearly articulate their projects to themselves or to others, hindering planning and development, weakening school-university ties, and short-circuiting the energy of the particular project.

Reasons for Collaboration

In 1974 with the pairing of the University's Amherst Campus and Boston English High School as part of a court-ordered desegregation of the Boston Public Schools, the School of Education began the planning of collaborative projects with urban school systems. Presently, the School is expanding its Boston Project to include twenty more secondary schools, while developing other programs in the cities of Lawrence, Holyoke, Springfield, and Worcester. The goal in each instance has been to focus University off-campus graduate degree programs on school system needs for professional staff development and school improvement.

Table I rank orders according to importance the inservice activities typically proposed for school-University collaborations by school system and University planners. The chart shows activities proposed do not necessarily coincide. The differences clearly mapped in Table I are not always apparent to the planners of these projects. As I shall argue, planners from both institutions may assume these differences to be non-existent, or, to the extent they are recognized, to be insignificant to the planning process.

How the project is viewed, or, what is obvious to and unrecognized by project planners, will determine significantly the presence of cooperation or conflict in the planning and development. However, before considering this crucial point, it is necessary to examine how and why urban school systems and the University School of Education collaborate with one another.

Urban school systems in Massachusetts are facing issues common among older cities in the northeastern United States: decreasing revenues,

Table I

Levels of Importance Assigned to Inservice Activities
by Urban School System and University Planners

	Urban School System	School of Education
Primary Importance	Professional Development Workshops	On-Site Graduate Degree Program
	Personal Development Workshops	Graduate Courses for Teachers
Secondary Importance	Graduate Courses for Teachers	Professional Development Workshops
	On-Site Graduate Degree Program	Personal Development Workshops

Inservice Activities

increasing enrollments of minority students, stable, predominantly non-minority teaching staffs, and the growing concerns about academic performance and poor-quality instruction in secondary schools. These issues, coupled with the impact of the state's tax-limiting legislation, Proposition 2-1/2, present urban systems with the need for professional development of teachers and organizational improvement of schools.

Assistance from universities in areas of curriculum and program development, school administration, classroom management, and community relations can be an important component of school system efforts to meet these needs. There is a school system assumption that the presence of university personnel will enhance the credibility of its efforts. For the school administration, enhanced credibility can be translated into local political support from the School Committee, the city government, and the minority community.

University involvement may also increase support of such external groups as the State Department of Education or private funding sources.

University courses for credit may also serve as an incentive for teachers to participate in school system sponsored activities. In Massachusetts, teachers and administrators move up the salary scale by acquiring additional graduate credits. An extension of this incentive, the opportunity for staff to earn additional graduate degrees in a university on-site degree program, may be viewed far less favorably by a school system. Additional degrees might provide the holder with greater professional mobility. If even a few school personnel leave the system after earning a degree in a university-school system project, the program might be in the politically vulnerable position of being seen as encouraging movement of staff from the system. In terms of this paper, the important point is that the activities proposed by school systems for school-university projects typically reflect the realities of the situation as seen by planners in school systems.

The reasons for collaboration are no less complex when the University School of Education is considered. The School is encountering issues similar to other schools, colleges, and departments of education in public universities: a shifting and declining student population, restricted budgets, and the continual need to define the institutional balance between teaching, research, and public service. In response, off-campus graduate degree programs have become increasingly emphasized in school planning. Presently, off-campus programs of the School of Education operate throughout the state of Massachusetts. Over 300 professionals, 30 percent of the School of Education graduate population, and 67 percent of the University's total off-campus graduate activity, are served by these programs.

The overwhelming majority of these off-campus programs involve school systems. In each case, teachers and administrators are provided with credit courses and graduate degrees delivered on site by regular and adjunct faculty of the School of Education. The opportunity for graduate courses, and even more significantly, a graduate degree program, represent a potential new market for the School of Education's expanding outreach effort.

In publicly-funded universities, public service activities are significant. Assisting schools in meeting problems posed by changing school populations constitutes an important public service whether or not graduate courses were offered. The dilemma for School of Education planners is finding a balance between public service activities and the more pressing issues of enrollments, budgets, and off-campus credit programs. As with school systems, university actions in the planning of school system-university projects reflect the realities of the situation as perceived by university planners.

Sources of Conflict

Sarason (1982) in reviewing the Rand Studies of Educational Change (Berman and McLaughlin, 1979) contends that it is the way in which the change process is conceptualized that is the key to the success or failure of the change effort. "You can have the most creative, compellingly valid, educationally productive idea in the world, but whether it can become embedded and sustained in a socially complex setting will be primarily a function of how you conceptualize the implementation-change process" (1982: 78).

Sarason's comments help to illustrate how elaborately conceived projects, deemed important by planners from both urban schools and universities, become dominated by cooperation or conflict. The central question here is, do individuals involved in planning develop a clear picture of what it is they want to implement? Sarason's answer might be--"A how-to-do-it view effectively obscures a complex of how-to-think-about-it issues" (1982: 78)--meaning, without an understandable change process, projects will be unable to generate commitment to or momentum for change from among the people the project is intended to serve.

Planners of university-school system projects are constantly struggling with how to provide inservice educational opportunities to school personnel. If they fail to reach agreement, they provide teachers, administrators, and aides with different, partial inservice models, and never communicate a clear conceptualization of the projects to staff in the schools. Accordingly, such projects do not gain the interest or the trust of the majority of school personnel.

It is crucial to realize that a clear conceptualizing of school system-university projects by planners is not blocked by the fact that schools and universities have different reasons for collaboration. Rather, the central obstacle to cooperation, and the principal source of conflict, is that the divergent goals of the collaborating institutions remain continually unrecognized, unexamined, and unplanned for by planners.

The ideas of Karl Weick (1979) about the social psychology of organizing are relevant here. At the outset of an organizing process, he asserts, "There is no immediate requirement for a shared goal" (Weick, 1979: 92). He further proposes that the common view that groups or organizations are formed around common goals be replaced by the view that groups or organizations form first around common means. He adds, "In any potential collectivity, members have different interests, capabilities, preferences, and so forth. They want to accomplish different things. However, to achieve some of these diverse ends, concerted, interlocked actions are required" (Weick, 1979: 91). Applying Weick's view to planning school-university projects, the message is clear: planners need to recognize and state the potentially divergent interests of schools and universities, and then, to develop ways for both organizations to achieve such different objectives within the same activities of a collaborative project.

From a planning perspective, the means to achieve diverse ends is not developed if planners see themselves as working to further goals they assume the school system and the university have in common. These assumptions precede recognition that the school system and the university have different, and potentially competing, reasons for establishing a project. Consensus and commonality of interest become taken-for-granted components of the planning process. As Weick suggests, "All people in organizations have assumptions and things they take for granted, and all of those assumptions contain some hint of extent or pervasiveness in them" (1979: 52). In such cases, school and university planners will be unable to recognize the collision course they may be setting for themselves.

Conclusion

The features of cooperation and conflict outlined in this paper are embedded in the day-to-day complexities and urgencies of planning and organizing urban school system-university collaborations within extremely tight time lines. Planners, wrestling with the need to arrange activities and searching for ways to do so, do not always, in their planning, make explicit what I believe are implicit features of their activities. In designing projects, they may engage in ongoing, fluid, and highly complex interactions from unrecognized cross purposes. They, in Garfinkel's terms, "avoid the very situations in which they might learn about them" (1967: 70). In such cases, the result will be an unclear formulation of what the project is supposed to be--a school system professional development program, a university off-campus graduate program, or some combination of the above. However, the diverse goals of an urban school system-university collaboration, which can be a stumbling block, may be transformed into a major strength when implicit goals are made explicit. Then, school system and university planners understand each other and their tasks differently, and cooperation, rather than conflict, may dominate.

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AFFIRMATIVE ACTION AT AN URBAN CAMPUS OF A STATE UNIVERSITY

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The University of Missouri-St. Louis is one of four campuses of the University of Missouri system. Founded in 1963 as part of the movement to provide state supported higher education at a reasonable price to the citizens of a metropolitan area, the St. Louis campus has grown to a student body of approximately 11,000 students.

As a result of being located in a metropolitan area, interest in affirmative action has always been strong. While federal acts and executive orders on non-discrimination in employment began in 1963, it was the Equal Employment Opportunity Act, Amendments to Title VII, Title IX which brought the creation of the Affirmative Action Office to the St. Louis campus of the University of Missouri. The Act was passed in 1972.

Part of the legislation required each campus to prepare an Affirmative Action plan. On the UMSL campus the Associate Dean of Faculties assumed the responsibility for developing such a plan. As a result of statistical studies made at this time most faculty women received salary adjustments. By the 1974-75 academic year it was obvious that a full-time Affirmative Action Officer had to be hired. Not only was the plan still incomplete but one woman who had not received the salary adjustment filed a discrimination suit with the Missouri Commission on Human Rights and a group of women who were not faculty and hence had not received the salary adjustment filed a class action suit with the Equal Employment Opportunity Commission and the Department of Health, Education and Welfare/Civil Rights Office.

Several minority members were known to be considering filing complaints.[1]. It was obvious that the Associate Dean of Faculties had neither the time nor the expertise necessary to organize affirmative action activities. In addition to completing the plan someone had to give time and effort to dealing with the current charges of discrimination, conciliate grievances to prevent additional charges from being filed, make certain that appropriate bureaucratic machinery was created in order to ensure compliance with federal guidelines, and monitor compliance at least for the foreseeable future. While a national search was mounted for an Affirmative Action Officer, a faculty member was appointed to give 60% of his time to the job. The first full-time Affirmative Action Officer was appointed in August, 1975.[2]

The establishment of the Affirmative Action Office did not meet with widespread approval. Some opposed the principle of affirmative action on the grounds that putting people into groups curtailed individualism. Others thought the establishment of an Affirmative Action Office would draw money away from academic programs. Others thought affirmative action would result in hiring second rate personnel. But affirmative action had its proponents. Those individuals countered the opponents by saying members of the "protected groups" wanted to be treated as individuals. They wanted to be judged on their qualifications. But the fact was they were discriminated against because they were perceived not as an individual but as a member of a group. As to the second argument that the establishment of an Affirmative Action Office would cost money it was pointed out that it would be money well spent since the office was viewed as a means to prevent inequity, to conciliate grievances and keep the university out of costly trouble. As to the third charge its proponents contended affirmative action did not mean quotas, it meant goals. The hiring officer was to actively seek out members of protected groups but he/she was not obligated to hire a member of a protected goup if the individual was not the best candidate. The hiring officer did have to demonstrate that a fair search had taken place. One thing was certain. The creation of an Affirmative Action Office required institutional change and since universities tend to be traditional, any change is difficult to make. It took months for the Affirmative Action Office to be accepted on the St. Louis campus. The reality was the Affirmative Action Officer probably made the greatest headway as a result of administrative and certain faculty support. Particular progress was made after investigative visits to the campus by EEOC and/or HEW officials. Individuals began to see that conciliation and a change of practice was not only the right policy to follow it was the policy which would be less costly in time and money.

The first Director of Affirmative Action developed the campus plan, recruiting procedures, administrative approval forms and established interim grievance procedures. During this period the female faculty member who had filed with the Missouri Commission of Civil Rights also took her case to EEOC. A settlement was arranged. The new Director did what she could to settle the 29 other complaints which were filed with federal agencies between 1972-1976 charging discrimination. It was not until February, 1977 that the Office of Civil Rights of HEW investigated the class action suit filed by the group of women in 1974. The campus however, found the visit of the federal officials to be most unsettling. "Great quantities of materials were requested", the interviews were not on schedule, some felt appropriate legal advice was not available and as the federal officials left, no one knew when they would return, if ever. In 1980 the campus was informed the case was closed as a result of lack of jurisdiction.[3]

By September 1977 a new Affirmative Action Officer was hired. In that year only 4 charges of discrimination were filed with federal agencies. The new officer initiated a job register and prepared a longitudinal workforce study comparing availability and utilization of women and racial minorities. New efforts were made to open jobs previously closed to women and minorities. The first black police officer was hired in 1975 as was the first female police officer. Other statistics of interest are as follows:

- an increase in black students from 7% to 10.8% between 1972 and 1980
- an increase in minority faculty from 3% to 8% between 1972 and 1981
- an increase in female faculty from 20% to 26% between 1972 and 1981
- an increase in female staff from 41.6% to 45% between 1975 and 1980[4]

The new director also carried out a professional development affirmative action program for faculty chairpersons, and cooperated with the Office of Civil Rights in an extensive review of potential areas of racial discrimination in regard to students. The review indicated the campus did not discriminate against students on the basis of race. There had been serious problems relating to women's athletics. The Affirmative Action Officer did a great deal of conciliatory work in helping to open the gymnasium and general athletic facilities to female faculty, students and staff. Women did take part in intercollegiate activities but did not receive scholarships until 1975. There was not a full array of women's intercollegiate teams until 1981. In addition an Affirmative Action Plan complying with Executive Order 11246 was developed and reviewed and was one of the first in the nation to be accepted.[5]

This fall, however, the campus settled a race discrimination charge and defended itself against a reverse discrimination charge. The rash of charges however is lessening. Between 1978 and 1981 only four charges were filed. The most time consuming activities in the Affirmative Action Office today are facilitating the construction changes necessary to aid handicapped persons move about the campus with some ease, combating age discrimination, developing non-sexist and non-racist types of atmosphere and programs. Sexual harassment had become a difficult but important item for campuses to address. Still a major part of the Affirmative Action Office is the updating of the campus plan in which goals are set to hire and promote members of protected groups. If higher education is to provide models for its pluralistic student body then affirmative action will remain an important part of the administrative structure. In the difficult days ahead with reductions of faculty and staff it is quite possible that the Affirmative Action Officer faces a new and probably more difficult job. Yet the importance of appropriate role models among faculty and staff for students to emulate as well as the importance which must be attached to students having an experience of being treated equitably cannot be handled lightly. An institution of higher education, placed purposefully in an urban area in an effort to extend opportunity to a wider spectrum of students, must not only preach but must practice equality in order to make its presence and its promise have a ring of truth.

FOOTNOTES

1. UMSL: Tenth Anniversary Oral Interview, March 21, 1974, Donald A. Murry, p. 43; UMSL: Tenth Anniversary Oral Interview, April 23, 1974, Jane Miller, p. 15;

2. E. Turner, Interim Chancellor to B. Middleton, Acting Affirmative Action Director, January 21, 1975; History of UMSL, Office of Affirmative Action, Chronology of Events.

3. History of UMSL, OAA, Chronology of Events; Sylvia J. Lang, Affirmative Action Officer, to Arnold B. Grobman, Chancellor, March 1, 1977; UMSL: Tenth Anniversary Oral Interview, April 23, 1974, Jane Miller, pp. 7-11; Narrative, OAA, Lois VanderWaerdt, September, 1982.

4. Narrative, OAA, Lois VanderWaerdt, September, 1982.

5. History of UMSL, OAA, Chronology of Events; Narrative, OAA, Lois VanderWaerdt, September, 1982.

Note: The material in appendices was obtained from the UMSL Affirmative Action Office.

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APPENDIX I

EEO-6 OCCUPATIONAL CLASSIFICATION COMPARISON

Fulltime - Minority

Category	1975 Total #	1975 Min. #	1977 Total #	1977 Min. #	1979 Total #	1979 Min. #	1980 Total #	1980 Min.
Administrative								
#	53	3	93	8	82	4	77	3
%		5.7%		8.6%		4.9%		3.9%
Faculty								
#	398	23	397	31	402	31	404	31
%		5.8%		7.8%		7.7%		7.7%
Professional Non-Faculty								
#	81	11	58	7	58	8	70	11
%		13.6%		12.1%		13.8%		15.7%
Clerical								
#	220	32	224	33	225	52	225	40
%		14.5%		14.7%		23.1%		17.8%
Technical								
#	32	4	29	6	36	5	34	5
%		12.5%		20.7%		13.9%		14.7%
Skilled Craft								
#	31	3	54	4	58	6	56	4
%		9.7%		7.4%		10.3%		7.1%
Service/Maintenance								
#	166	92	189	108	170	104	163	96
%		55.4%		57.1%		61.2%		58.9%
Total Campus								
#	981	168	1044	197	1031	210	1029	190
%		17.1%		18.9%		20.4%		18.5%

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APPENDIX II

EEO-6 OCCUPATIONAL CLASSIFICATION COMPARISON

Fulltime - Female

Category	1975 Total #	1975 Fem. #	1977 Total #	1977 Fem. #	1979 Total #	1979 Fem. #	1980 Total #	1980 Fem. #
Administrative								
#	53	5	93	17	82	18	77	19
%	9.4%		18.3%		22.0%		24.7%	
Faculty								
#	398	94	397	111	402	112	404	107
%	23.6%		28.0%		27.9%		26.5%	
Professional Non-Faculty								
#	81	40	58	34	58	33	70	38
%	49.4%		58.6%		56.9%		54.3%	
Clerical								
#	220	215	224	223	225	223	225	223
%	97.7%		99.6%		99.1%		99.1%	
Technical								
#	32	14	29	16	36	17	34	18
%	43.8%		55.2%		47.2%		52.9%	
Skilled Craft								
#	31	0	54	0	58	2	56	2
%	0%		0%		3.4%		3.6%	
Service Maintenance								
#	166	40	189	58	170	57	163	56
%	24.1%		30.7%		33.5%		34.4%	
Total Campus								
#	981	408	1044	459	1031	462	1029	463
%	41.6%		44.0%		44.8%		45.0%	

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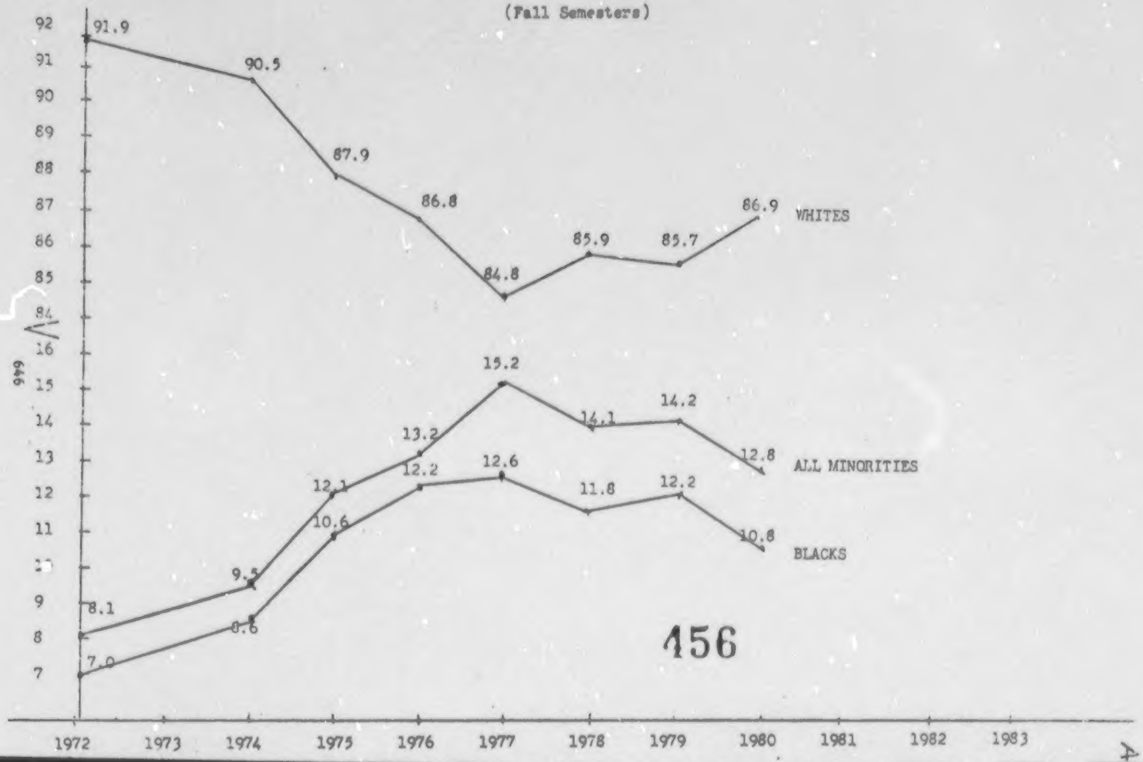
APPENDIX III

9 YEAR MINORITY ENROLLMENT COMPARISON

(Fall Semesters)



APPENDIX IV

LISTING OF FEDERAL ACTS AND EXECUTIVE ORDERS ON NON-DISCRIMINATION IN EMPLOYMENT

YEAR	LEGISLATION	BASE(S) OF NON-DISCRIMINATION	EMPLOYERS COVERED	FORM(S) OF REMEDY	MONITORING AGENCY
1963	Equal Pay Act	Sex	All employers	Administrative and private cause of action	Equal Employment Opportunity Commission
1964	Civil Rights Acts - Title VII	Race, color, religion, national origin or sex	All firms with more than 15 employees	Administrative and private cause of action	Equal Employment Opportunity Commission
1965	Executive Order 11246 as amended by Executive Order 11375 (1967)	Race, color, religion, national origin or sex	Firms with Federal contracts in excess of $10,000	Administrative	Department of Labor, Office of Civil Rights, Office of Federal Contract Compliance
1972	Equal Employment Opportunity Act, Amendments to Title VII, Title IX(education)	Race, color, religion, national origin or sex	State and Local Governments and Federal Contractors	Administrative and private cause of action	Equal Employment Opportunity Commission HEW/OCR
1973	Rehabilitation Act - Section 503	Handicapped	Firms with Federal contracts in excess of $2,500	Administrative and Judicial by the OFCCP Director and private cause of action	Agency bestowing the financial assistance
1973	Rehabilitation Act - Section 504	Handicapped	Recipients of Federal financial assistance	Administrative	Agency bestowing the financial assistance
1974	Vietnam Era Veteran's Readjustment Assistance Act - Section 402	Disabled Veterans and Vietnam Era veterans	Federal contractors - subcontractors of $10,000 or more	Administrative	Office of Federal Contracts Compliance Programs
1976	Executive Order 11914	Handicapped	Recipients of Federal funds	Mandates the Secretary of HEW to coordinate the implementation of 504 regulations to include recipients of funds from all other Federal departments and agencies.	
1974	Age Discrimination Act	age 40-65	all firms with 15 or more employees	Administrative and private litigation	Equal Employment Opportunity Commission

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III

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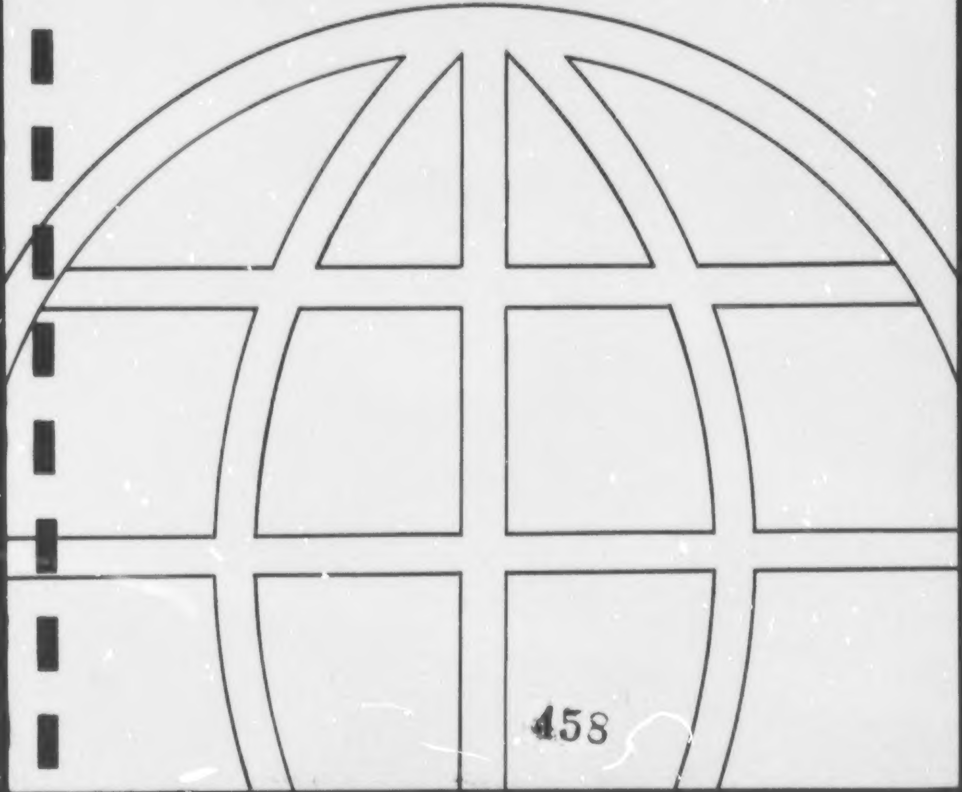

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COMPUTER ASSISTED INSTRUCTION AND LEARNING STRATEGIES

WHICH WAY TO GO?

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INTRODUCTION

Teachers in engineering have the responsibility to use the best possible methods available to help students acquire the knowledge and skills they will need to practise as engineers in industry. Consequently, it is important that students are provided with different and alternative learning experiences, since 'the evidence taken as a whole is unequivocal that there is no correct way to learn or to teach' (Entwhistle 1981). Recognising this, over the past five years - besides using conventional lectures, tutorials and laboratory experiments - a tape/slide framework (Button et al 1980) has been used to help some TEC, HND and BSc students to learn thermodynamics. Over this period, all the students on the BSc course have been questioned about their attitunes to, and feelings about, using this medium. A discussion of these has been prepared (Button 1983).

In implementing any novel system designed to improve student learning, the performance of the students should be evaluated objectively. This can be achieved by assigning coursework based on behavioral objectives prescribed for the novel medium, and by eliciting student attitudes.

Based on experience and the interpretation of student attitudes to the tape/slide framework and supported by literature in the field of educational psychology (see for example Entwhistle 1981 and Hartley and Davies 1978) it would seem that a significant deficiency of our teaching is the absence of any methodologies directed towards the tailoring of that teaching to the differing needs of students who exhibit different styles and strategies of learning. There is also a need to control the availability of the correct answers to test questions, often called feedback (see McCann 1981). These answers are presently provided on handouts accompanying the tape/slide support documents and questionnaires.

Computer assisted instruction (CAI) and computer assisted learning (CAL) have become pervasive technologies in all fields of education. Experience must be gained in the use of these technologies in order that their apparent benefits can be assessed. In addition there are several other reasons to use a computer based system.

1 It has the potential for monitoring student learning strategies and providing a medium which caters for different strategies.
2 It has the ability to control the delivery and the content of the feedback.
3 It has the ability to provide animated displays which may be used to illustrate more clearly the dynamic processes frequently found in thermodynamics, and to create more lasting visual impressions.
4 The students who have used the CAL simulation of a gas turbine (Button and Needham 1982) have been enthusiastic about it (Button and Cox 1982).

The developments at the forefront of CAI are variously called adaptive, generative or intelligent CAI (see Mitchell 1982 and McCann 1981) or intelligent tutoring systems (Sleeman and Brown 1982). These have three features in common which have been described by Mitchell as :

1 a knowledge representation of the subject matter ;
2 a representation of each student's inferred knowledge state;
3 a representation of the teaching process for the selection and implementation of teaching strategies and tactics matched to the learning style and capability of each student.

The development of such systems is beyond the resources of most prospective CAI authors. In order to utilise the notion of learning styles in CAI with limited resources, it is proposed that the learning style must be made explicit and the subject matter presented in different ways to match the learning strategies of identifiable groups of students.

While there is a wealth of literature on different learning styles and strategies, the work of Pask and his associates (Pask and Scott 1972 and Pask 1976a and b) stands out because it proposes a cognitive framework which can be related directly to CAI. With this as a basis, a step-by-step approach is proposed which may be used to evaluate learning strategies and/or to implement a CAI system.

LEARNING STRATEGIES

Pask proposed two mutually exclusive learning strategies, holist and serialist, and argues that these strategies may be manifestations of more general learning styles. Students who adopt these styles are called comprehension learners and operation learners. Comprehension learners (who are disposed to act like holists) readily pick up an overall picture of the subject matter, build descriptions of topics and describe the interrelationship between topics. Operation learners (who are disposed to act like serialists) pick up rules, methods and details and build procedures and concepts for isolated topics.

Both description building and procedure building are seen to be prerequisites for a complete understanding of any subject. The distinction between comprehension learners and operation learners is therefore a matter of degree and must be seen in relation to levels of ability in each style. Students who exhibit high levels of ability in both of these strategies are termed versatile learners.

Using these learning strategies, the difference between serialists and holists may be seen as follows. Serialists put much more emphasis on procedure building, relating to individual topics and logical sequences connecting them. They form an overall description of what is being learned rather late in the process. Holists, on the other hand, use description building right from the start. They build an overall picture as a guide for learning, and use procedure building much later on to fill in the detail.

Pask has demonstrated that mismatching learning strategies with extremes of teaching strategies has detrimental effects on learning (Pask and Scott 1972). Most CAI represent an extreme serialist teaching strategy.

Pask's tests do however demonstrate that even within a programmed instruction framework, it is possible to present materials in different ways to suit different learning strategies, i.e. in the Gandlemuller test (Pask and Scott 1972).

It is proposed that the serialist teaching strategy, found in the fairly linear instructional sequences of most CAI, may be adapted to the needs of holist students by feedback rich in analogical relationships and interrelationships between topics.

It should be noted that this proposal differs from Pask's subsequent work, and the approach to adaptive CAI, in that they allow the student to select information from the knowledge structure according to his or her competence. A representation of the students learning strategy is not required. In order to administer feedback on a prescriptive basis, the student's learning strategy must be made explicit.

Pask has developed a number of instruments for estimating an individual's bias towards versatile, comprehension and operation learning. One of these 'the spy ring history' (Pask 1976b) takes between one to two hours to administer and requires the student to learn and recall the growth of an international spy ring over five historical epochs.

Before contemplating using a 'measured' learning style in a prescriptive way, it is important to consider the effect the environment has on student learning.

Pask (1976b) noted 'that competence in using a strategy does not always go alongside a disposition to adopt it . . . As a rule, these students feel they ought to adopt a serial approach ... These individuals cannot learn subjects at a 'deep level' (unless they are introduced to, and employ a holist strategy). The converse imbalance (students who feel they ought to take a global view but are adept serialists) is less common, but has been observed.'

Marton and his co-workers in the Göteborg research group (see Gibbs et al 1982) have investigated how students tackle the task of reading academic articles and texts, primarily in economics and the humanities. The perspective of the research emphasizes the importance of what the students understand, rather than the more conventional 'how much has been learned'. Significant amongst the findings are the effects of the students' concepts of learning and their perception of the task. Marton (in Hartley and Davies 1978) describes two fundamental approaches : deep level and surface level. Students who adopt 'deep level' processing can be described as conclusion orientated, while those who adopt a 'surface level' processing are description or content orientated. These levels of processing may be seen to have parallels in Pask's comprehension and operation learning styles. Laurillard (1979) distinguishes between them in that Pask's styles define the execution of a learning task while Marton's levels define the approach to it.

Laurillard found that at the cognitive level students make decisions about how to approach tasks, and how to structure the subject matter. At the contextual level their perception of the aim of the tasks, the requirements, and the nature of the teaching, influence these decisions. She concludes that the students cannot be characterised in terms of a dichotomised description of learning, because they are responsive to the environment and their approach to learning is determined by their interpretation of that environment.

Laurillard's work illustrates the effort required and the difficulties involved in interpreting individual learning styles in realistic contexts, and the importance of Marton's student centred perspective in such interpretations.

Therefore, in order to gain an understanding of the relationship between any 'measured' learning style, the learning strategy adopted and the outcome, in relation to different presentations of instructional materials, it is essential to use Marton's perspective to elicit individual students' perceptions of the task and their concepts of learning.

A STEP BY STEP APPROACH TOWARDS INTELLIGENT CAI

If CAI is to be used, the ultimate goal should be an intelligent CAI system. To evaluate and develop such a system is beyond the resources available. Nevertheless a step-by-step approach is proposed starting with, and based upon the tape/slide framework and the instructional materials which are in use. This route may lead eventually towards the perceived goal.

The system required for the first step could be called a self learning assessment module (SLAM). This will require a minimum of resources because one microcomputer can service the needs of a number of student workstations. Initially the system will contain prerequisite and post test questionnaires, now self administered by the students. Based on the results of these tests, student activity on the tape/slide modules can be directed. By relating questions to individual elements of the tape/slides, it may be possible to use the data collected to diagnose specific areas or topics that students find difficult. This data can be used to direct changes in the instructional material. The additional advantage of the system is that it will provide a resource that students can use for revision, either prior to the final examinations or after periods of absence, *e.g.* vacations, industrial training periods or sickness.

The next step will demand a significant increase in resources, since individual terminals must be available at each student workstation. By integrating a microcomputer with each tape/slide unit, the instruction materials on the tape/slide framework can be used, and all the questions can be administered by the microcomputer. By controlling the availability of knowledge of the correct responses to the interactive questions in this way, the possibility of a 'cheat' condition is avoided. Anderson et al (1971) showed that the uncontrolled access to the correct response resulted in significantly less learning. Within such a system it will be possible to provide supplementary learning materials in the form of feedback and help facilities.

Step three will cover the investigation of individual learning styles to see whether they can be identified; how they are modified by the context and student perceptions of the task; what effects they have on the learning outcome; and whether by prescribing different types of feedback there are benefits for students who have different learning styles. Two types of feedback are envisaged : one rich in analogical relationships, drawing on and relating to many other topics, the other limited to logical relationships within a narrow focus.

Such an investigation would entail the assessment of learning style, affective attributes (such as motivation and anxiety) and ability; the division of students into two groups, each group containing equal numbers of students exhibiting different learning styles and balanced on ability and affective attributes; the prescription of a different feedback type for each group; and

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interviews to establish concepts of learning, perceptions of the task and the strategy adopted.

In the fourth step it is proposed to develop topic maps for each tape/slide module and to analyse the content of topics, i.e. facts, concepts, procedures and rules. Based on such analyses, behavioral objectives would be formulated, test questions designed and each module prepared as a CAI lesson.

The fifth, but far from final step would be the integration of the module topic maps and content analyses into an entailment mesh (Pask 1976b). By incorporating a representation of this mesh and instructional materials within a computer administered framework an approximation to Pask's conversational domain can be effected. Understanding will however only be demonstrated by answering the questions based on behavioral objectives, rather than the more rigorous demonstration by modelling demanded by Pask. The answers to the questions may serve as the basis for a representation of the students' inferred knowledge state, which can be used to control the students' access to the topic database.

CONCLUDING REMARKS

Should the emphasis be given to the evaluation of learning strategies? Such an evaluation would require a significant effort, and would involve techniques and the application of theories in which the authors have little experience. Nevertheless there are many possible benefits.

1 The identification of groups of students who may benefit from guidance in methods of study.

2 A better understanding of the effects of programmed instruction and CAI on the learning of individual students.

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3 The improvement in methodologies for generating and using instructional materials within CAI.

4 An insight into how students perceive the aim of the teaching and the effect of this on the approach they subsequently adopt.

5 The identification of any relationship between comprehension/operation learning and deep/surface levels of processing in an engineering discipline.

Alternatively these evaluations could be omitted and the available effort used to develop knowledge structures and instructional materials. Subsequent developments may lead to systems in which the student can choose the sequence of topics and structure the subject matter to suit his or her individual needs. In the meantime, there is a possibility that some students may be mismatched with the teaching strategy and may then be at a disadvantage.

This then is the dilemma. Should the assessment of student learning strategies, styles and approaches and the evaluation of the effectiveness of a simple CAI system for students with different learning styles be tackled, or should the available effort be used to produce a uniform quality of courseware which all student will use?

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A FIVE-YEAR SUMMARY OF STUDENT ATTITUDES TO AND PERFORMANCE IN A THERMODYNAMICS COURSE TAUGHT USING A TAPE/SLIDE FRAMEWORK

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INTRODUCTION

Thermodynamics is part of any BSc degree course in Mechanical Engineering. Our course lasts four years and contains two industrial training periods sandwiched between three academic parts. Normally nine subjects are studied by the student during each part of the course. Thermodynamics, like other core subjects, is compulsory for the first two parts and optional in the third part. Part one Thermodynamics is equivalent to half a subject in terms of time allocation and this is timetabled for forty-five hours in two-hour periods spread over twenty-eight weeks.

Over the past five years Thermodynamics has been taught using a tape/slide framework. Within this framework, one hour is allocated for an introductory lecture, eight for tape/slides, twenty-six for tutorials, seven for laboratories and three split between the midsessional and the final examinations. By comparison in a lecture framework sixteen hours would be allocated to lectures, nineteen to tutorials and none to tape/slides. There are normally about sixty students in a class and the lectures are given by a single member of staff; for tutorials and laboratory work the class is split into four groups, each with a member of staff. Further details of the Thermodynamics course, its aims and content and the reasons for choosing a tape/slide framework can be found in Button et al (1980).

Since this tape/slide framework was fully implemented the students' feelings towards, and attitudes to, learning Thermodynamics in this way and other aspects of the degree course, have been evaluated in the form of a questionnaire. This paper presents a summary of the responses made by the students to the test items related to Thermodynamics in the questionnaire, together with a report of their final examination performance compared to those for the previous five-year period and with those for other core subjects.

QUESTIONNAIRE

Following individual interviews with six students, who had completed the Thermodynamics course using a tape/slide framework, a Likert scale questionnaire was developed on the basis of the responses they made to questions about their experience. A six-option scale was used to try to discriminate between degrees of feeling. This was presented after each item in the questionnaire as '+3 +2 +1 -1 -2 -3', ordered in columns and headed on each page by 'TRUE FOR ME' and 'NOT TRUE FOR ME'.

The questionnaire started with an explanation of its purpose, and guidelines for answering the items, and finished by asking the students to specify aspects of their experience which impressed them most favourably and least favourably. The responses made by the students were anonymous. The questionnaire has forty-five test items which have remained the same over the past five years and thirty of these relate to Thermodynamics.

SUMMARY OF QUESTIONNAIRE RESULTS

Over the past five years one hundred and eighty-one completed questionnaires were received representing a sixty-six percent return. The results have not yet been analysed statistically in any way, but the percentage of the responses to each test item that were 'TRUE FOR ME' have been calculated for each year and for the five year period. The items are categorised under particular headings, related to different aspects of the experience of learning Thermodynamics in a tape/slide framework. The following interpretation of the responses to the test items is based on the five-year averages and the clear trends where they exist.

Lectures

Although seventy-one percent of the students felt that lectures were very effective in presenting information, eighty-four percent believed that they learnt more in tutorials, and over the last three years fewer than half the students thought they learnt more from a book or lectures than from the tape/slides. More than ninety percent of the students felt that tape/slide programmes should be used as a backup to lectures; further questioning would be required to find out whether these students want tape/slides to support lectures or vice versa. An increasing number of students (from thirty-five to nearly sixty percent) thought that Fluid Mechanics (a lecture framework) should be taught using tape/slides.

Tutorials

Over eighty percent of the respondents thought tutorials were invaluable and that they learnt more in tutorials than in either lectures or using the tape/slides. The numbers of students who wanted more tutorials, or felt that they learnt more from tutorials than tape/slides have decreased from about ninety percent by almost thirty percent since the tape/slide framework was first introduced.

Course work assessment

Of the order of eighty percent of the students thought more emphasis should be placed on course work and its contribution to the final mark should be increased. This is probably because the students perceive that course work marks are more within their control than is the result of a single final examination.

Organisation for the Thermodynamics course

The number of the respondents who thought that the Thermodynamics course was well organised increased after the first two years from about forty to eighty percent. At this same time there were marked improvements in student attitudes towards learning from tape/slides compared with tutorials and lectures and in their willingness to see other subjects adopt a similar organisation. Two changes in the course content and administration in the third and subsequent years may account for these changes. An advance organiser was given to the students at the beginning of the course, this told them what they had to do, when it was timetabled and the content and the submission deadlines for the course work. For the first two years the questionnaire was administered when the students returned from their first industrial training period. Since then it has been administered just before the end of the course.

Presentation aspects of the tape/slides

Nearly ninety percent of the students were satisfied with the quality of the slides, but just less than half of them found the music at the beginning of a tape/slide sequence off-putting.

Tape/slides as a vehicle for learning

About half the students felt that the tape/slides gave them the feel of Thermodynamics. Sixty-seven percent of the students felt the tape/slides helped to make a stiff subject easier. A sixth of the students thought they knew less Thermodynamics than when they started, but a similar number felt they only passed Thermodynamics because of the tape/slides. An increasing number of students (about thirty-five to sixty percent) thought that the Thermodynamics course dealt with every point that they had to deal with.

Over eighty-five percent of the students felt that they could complete the interactive text without understanding what they were doing and if they had to think more it would help. There was a temptation for about sixty-five percent of the respondents to bash on to complete the tape/slides and they sat down thinking that they only had to sit through the next twenty minutes. A similar number thought the information presented in this way did not sink in. Two features of the tape/slides are thought to contribute to these attitudes. One is that a fairly large number of slides need to be copied, this is designed to make the student take appropriate notes. The other is the ready availability of answers to the pre-test, post-test and interactive text questions. These answers are provided on an answer and a summary sheet in the handout which accompanies the tape/slide programme. Anderson et al (1971) showed that uncontrolled access to answers can reduce the amount of learning that takes place.

Viewing aspects of tape/slides

It was thought by half the students that watching the tape/slides individually would be an improvement when compared with the normal practice of watching in pairs. About the same number of students felt out on a limb when watching the tape/slide sequence. Some sixty percent of the students responded that the process of watching tape/slides can be irritating, while not surprisingly over seventy percent of the students didn't feel any personal contact when watching the tape/slides.

Selected free response comments

Most favourable impressions

Tutorials very useful and helpful.

Course well organised.

The summary sheets were very useful.

Tape/slides can be repeated at your own pace.

Tape/slides very useful as a backup for revision.

Being able to do the tape/slides when I wanted to.

Flexibility and repeatability of the way information is presented in tape/slides.

Thermodynamics relates theory with practice.

Tape/slides are great, you can repeat them.

Least favourable impressions

Tutorials are not allocated sufficient time.

Lectures followed by tape/slides would have been better.

I did not try to understand the tape/slides because of the summary sheets.

You cannot ask questions of a tape/recorder.

Tape/slides assume we all think and learn in the same manner.

We are not automatons.

Tape/slides are inflexible, give an overwhelming quantity of information with a boring voice.

I did not learn from tape/slides but from text books.

A chronic method of learning.

These free responses are yet another illustration that there is no 'correct' way to learn or to teach (Entwhistle 1981). While a number of students obviously enjoyed and felt they benefitted from the tape/slide framework, others have strong feelings against it. Evidence for such dichotomised views on learning proliferate in the literature. If alternative teaching methods are to be provided or developed, for students who do not feel they benefit from the tape/slides, more information on students who view the tape/slides in different ways need to be obtained.

EXAMINATION RESULTS

Although students take a combined examination in Thermodynamics and Fluid Mechanics at the end of part 1, the overall average marks do represent the average mark obtained for the Thermodynamics questions attempted. The table shows that the final examination results for the students using a tape/slide framework are not significantly different to those using a lecture framework. This result agrees with the work reported by Imrie (1982). He quotes the work of Dubin and Taveggia (1968), who from an inspection of more than one hundred studies on the effectiveness of various methods of college teaching concluded that 'These data demonstrate clearly and unequivocally that there is no measurable difference among truly distinctive methods of college instruction when evaluated by student performance on final examinations'.

Table Average marks for part 1 examination 1972-1981

Year of entry	Student numbers	Mathematics		Applied Mechanics		Thermodynamics and Fluid Mechanics†	
72	18	57	58	58	55	55	55
73	30	51		49		54	
74	33	56		56		60	
75	20	53		61		49	
76	27	74		50		58	
77	66	57	59	50	51	47*	56
78	48	47		54		58*	
79	58	61		47		61*	
80	61	71		54		57*	
81	48	59		49		57*	

† Examination format unchanged throughout.

* Tape/slide framework used for Thermodynamics.

Unless otherwise stated a lecture framework was used.

CONCLUSIONS AND FUTURE WORK

Student attitudes towards the use of tape/slides compared with tutorials and lectures has improved over the five years. Although students still feel they learn the most from tutorials, a majority now feel that they learn more from tape/slides than from lectures or books.

Examination of the student responses does indicate a number of aspects of the tape/slides which could be improved or warrant further investigation.

1 A procedure for controlling the availability of answers to test questions should be adopted, see Sutton and Dobbins (1983).

2 Questions involving the copying of slides should be replaced by questions requiring more active processing of the information by the student.

3 The questionnaire should be readministered to the students on their return from the first industrial training to evaluate the difference between students' immediate and retrospective attitudes to the tape/slides.

4 The questionnaire should be revised to elicit more clearly student attitudes towards, and their use of lectures, tutorials, the tape/slides and other study methods.

5 Further investigation and analysis of the student attitudes, together with individual interviews should be undertaken to establish whether student differences account for the range of responses encountered, and if so what action can be taken to better suit the needs of students who do not feel they benefit from the tape/slides.

6 Alternative methods of determining the amount and quality of the information learnt should be used to investigate changes in student learning and retention resulting from the use of the tape/slide framework.

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MONITOR THEORY AND SKILL LEARNING WITH COMPUTERS

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1984 approaches. Have we achieved utopia? Probably not. What constitutes utopia, at least in the projections of authors like George Orwell? In part, surely, the utopian scenario includes the technological revolution which has occurred with the arrival of mini-computers and micro-computers. The machines have arrived on campus and at home, and their arrival raises complex questions about teaching and learning in their presence. In particular: will the machines create a barrier to learning too great for even the best student/teacher relationship to overcome? The answer may lie in a deeper understanding of the nature of learning, particularly skill learning, and processes which enhance it. This understanding can be drawn from a recent proposal concerning the development of second language skills which can be generalized to all skill learning: the proposal is called Monitor Theory (Krashen, 1981), and because it provides a comprehensive analysis of the teaching/learning process, it sheds light on teaching effectiveness in the presence of the new technology.

Monitor Theory is the work of Professor Stephen Krashen, professor of linguistics at the University of Southern California. Krashen has developed Monitor Theory in connection with the process of second language acquisition among adult language learners. The central claim of Monitor Theory is that ability in a second language is developed through both acquisition, unconscious, internal, systematic processes and also through learning, or conscious, explicit mastery of rules. The theory includes a number of corollary hypotheses, each of which may apply to many other types of skill learning.

Monitor Theory begins by drawing a parallel between second language acquisition and first or native language acquisition. Krashen believes that adult learners master a second language in part through conscious learning, the kind of activity usually found in a classroom, and also through the unconscious systematic processes that are more characteristic of first language acquisition by children. Krashen and many other researchers believe that children's language acquisition comes about largely through unconscious, internal processes which are systematic in nature (deVilliers, 1979). Underlying this claim is the observation that while children are engaged in language acquisition on a full-time basis, they are totally unaware of the process going on. Krashen suggests that second language skills develop partly in the same way, that is, without conscious effort or attention. The corollary hypotheses of Monitor Theory explain the distinction between acquisition and learning in more detail and account for how both processes take place.

Before going on to look at the corollary hypotheses, the relevance of the central hypothesis of Monitor Theory for all types of skill learning should be made clear. Skill learning is a highly specialized type of learning task. Skill learning differs from substantive learning in that what is being developed is an ability which the learner can take away from the learning situation and apply in other situations, whereas in substantive learning, concepts and relationships must be mastered in a specific context, in a conscious, explicit way. Monitor Theory is useful in that it makes this distinction between skill learning and substantive learning, at least by implication. The insight that skill learning takes place in part by acquisition has relevance for many types of skill learning: for the development of language skills, math skills, scientific skills, and, of course, computer skills.

The distinction between *acquisition* and *learning*, insofar as it applies to all types of skill learning, suggests one way in which the new technology may, in and of itself, enhance skill development. The computer may have the capacity to reveal the acquisition process more directly than normal teaching can. It may be able to measure and assess a learner's acquisition of relevant skills through the learner's performance on a variety of tasks. That is, if the learner can do task A or B, the computer, because it can keep track of individual performance, may be able to tell the instructor that this learner has acquired certain skills. Research shows that such acquisition often proceeds in a non-linear but ordered fashion, and that the ordering does not always match either the order of presentation by the teacher or the ordering among other students. Krashen discusses the matter of ordering in the first corollary hypothesis of Monitor Theory.

The first corollary states that the elements of a second language which the learner masters through the process of acquisition are acquired in a specific order. Here, again, Krashen is drawing a connection between first language acquisition and second language acquisition. It is well established that children acquiring their first language do so in a series of stages. Most parents are familiar with these stages: children produce one word at a time, then two words, then begin to add grammatical endings and forms. The addition of grammatical endings and forms has been carefully studied (Brown 1973), and demonstrates another instance of well defined order. Krashen is arguing that second language learners also acquire elements of the language they are studying in an ordered fashion. It is interesting to note that the acquisition order for many learners does not always correlate with the order in which elements are taught, at least in second language classrooms.

In other types of skill learning, it may also be true that acquisition order and pedagogical order do not match, or at least, that they do not match all the time for all students. Because the computer can provide a reading of what aspects of skill the learner has acquired, it may also be able to provide materials for each individual in the optimum order for acquisition by that particular learner. This capacity is much broader than simple programmed learning or computer-assisted instruction. It requires that the computer perform highly specialized interactive functions, and makes use of its total variation capacity for the benefit of the learner.

The second corollary hypothesis of Monitor Theory also taps the interactive capacity of the computer, and is the principle from which the theory derives its name. Here, Krashen states that the rules of a second language which are mastered through conscious learning function only as a Monitor on the information which has been acquired. The Monitor is in operation only under certain conditions. The conditions under which the Monitor will work include situations where the learner has time, where the learner is focussing on the correct form of the language and where the learner is aware of the necessary rules. The Monitor, containing learned information, will help to shape what the learner produces from acquired information.

The problem of getting the Monitor to function appropriately represents a broad problem in teaching. How can the Monitor be made to work in an optimum way? Krashen has written an entire paper discussing the problem of individual variation in the use of the Monitor (Krashen, 1981), and he has found in research that there are some learners who are Monitor over-users, and some who are Monitor under-users. Learners can, however, be taught to use the Monitor in an optimum way. Because the computer can control learners' behavior with its interactive function, it may be the most useful device ever invented for teaching optimum Monitor use.

Suppose, for example, that a writing teacher wants to teach students not to edit their writing until they are through drafting an essay. If the writing is done on a computer with word processing capability, the machine may be programmed in such a way as to preclude editing before the draft is completed. The machine could be programmed to give the writer a message, upon receipt of an editing command, that says: DO NOT EDIT YET. Such a message would remind the student not to Monitor while in the draft stage of writing. Similarly, when the student finishes a draft, or better yet, wants to print a final copy of a paper, the machine could say: YOU MUST EDIT NOW, reminding the student to make use of the Monitor. It is easy to think of parallel situations in the teaching of math and science skills. The last two corollaries of Monitor Theory suggest ways in which all skill development can be facilitated, and by implication, ways in which the entire teaching/learning process can be enhanced.

Insofar as acquisition represents the most salient way in which new skills are developed, it is important to consider the conditions under which acquisition takes place. The third of the corollary hypotheses of Monitor Theory is called the "Input Hypothesis." In it, Krashen states that the conditions for acquisition occur when there is "comprehensible input", which has a variety of salient features. First of all, input which leads to acquisition contains language structures just beyond the ability of the learner, that is, which provides an appropriate challenge. In addition, comprehensible input must be deeply meaningful to the learner. Clearly, if learners are principally interested in theoretical physics, *International [illegible]* will not provide comprehensible input. The input must also be varied, and it must occur in vast quantity according to Krashen, in order to provide relevant data for acquisition to take place.

While teachers control comprehensible input in the classroom in every teaching situation, it is often impossible to provide just the right input for each learner in every class session. Invariably, a certain presentation might be just right for some students, but either too advanced or too simple for others. The computer represents an extremely helpful tool for providing comprehensible input which will meet all of Krashen's requirements. Because computer learning is interactive and individualized, it can provide input at precisely the right level for each student. Because it can tap a vast pool of material, the computer can provide deeply meaningful, appropriate and varied learning material for an individual. Moreover, ever-increasing micro-computer storage may provide the quantity of input Krashen says is optimum for acquisition. Home computers may give students access to comprehensible input any time and every time they want it. Finally, if students are treated well by their programs and human teachers, there is good reason to think that the machine will aid learning, despite learners' resistance to new information. This resistance to new material brings up the last corollary of Monitor Theory.

The final corollary is known as the affective filter hypothesis. The importance of affective factors in second language acquisition has been studied by several scholars (Guiora 1972, Schumann 1975, Dulay and Burt 1977). The affective factors include all those factors which influence the learner's internal state: feelings, motivation, interest, teacher/student relationships, ego factors, and so on. The affective filter hypothesis states that affective factors work as a filter or constraining device on input. If the learner's internal state is not conducive and receptive to input, even the best input will not result in acquisition.

The computer can help to lower the affective filter, if it is used right, and used well. Computers that are "user friendly", as most of the micros and minis are, will surely help to lower the affective filter. If the machine is seen as the primary teacher, then the human teacher's job, beyond programming comprehensible input, is chiefly to facilitate students' skill acquisition. Good teaching has, then, the greatest chance to flourish in the presence of the machine, because while the computer provides lots of good material in the right time and place (comprehensible input) the teacher can concentrate on setting up those situations most likely to lower the affective filter.

The input hypothesis and the affective filter hypothesis, taken together, have significant implications for many aspects of teaching. These hypotheses apply to all learners. That is, learners thrive on a limited challenge; learners function best when they are most interested in and motivated to master material, and learners perform best when the learning situation is conducive to success. What is important in Krashen's Monitor Theory is that it provides a comprehensive view of the teaching/learning process, sheds direct light on the shape that the material must take if it is to be acquired (comprehensible input), and takes into account the internal situation of the learner. Moreover Krashen gives teachers a specific goal to work toward in every teaching situation: learn to lower the affective filter so that students may acquire skills effectively.

Krashen's claims, then, carry over to all types of skill learning. The central claim of Monitor Theory is that skills are developed by adults through two processes: acquisition, which is unconscious and systematic in nature, and learning, which is conscious and explicit mastery of rules. The corollary claims are that acquisition proceeds in stages, and that the material that is mastered through learning functions only as a Monitor on the acquired system. The Monitor operates only under certain conditions. In addition, acquisition occurs only when there is comprehensible input, and only when the affective filter is down. Although Krashen has developed this theory working strictly on second language acquisition, it is clear that these insights can be applied to all forms of skill learning.

Skill learning can be enhanced with the computer if Monitor Theory is right. The computer will be able to report precisely what students have and have not acquired and learned based on their performance, in an objective and systematic way. Interactive computer programs can match new material to an individual's acquisition order. Similarly, the computer may enhance skill development by controlling Monitor use. By programming appropriately, teachers can make every student an optimum Monitor-user. The vast storage capacity of the computer and the facts that it is always on-line, and that is always ready to work for as long as the student chooses, make it the perfect device for providing "comprehensible input"—according to Krashen, the perfect data for acquisition. Insofar as computers are "user friendly," they will surely enhance skill learning by lowering the learners' affective filter. Thus, in short, the computer will not only facilitate skill learning, but can actively improve teaching. Monitor Theory provides a comprehensive analysis of the development of skills, explaining that skills develop through acquisition and learning both, and describing the optimum conditions of acquisition. The new technology gives teachers a tool through which to set up those optimum conditions of acquisition and thereby, a means of reaching students in a highly effective way.

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STAGES OF COMPUTER-ASSISTED INSTRUCTION

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Patrick Suppes of Stanford, a leader in Computer-Assisted Instruction, wrote an article for SCIENTIFIC AMERICAN entitled "The Uses of Computers in Education."[1] This was in September, 1966, computer eons ago. He wrote, perhaps extravagantly rather than prophetically. "One can predict that in a few years millions of school children will have access to what Phillip of Macedon's son Alexander enjoyed as a royal prerogative: the personal services of tutor as well informed and responsive as Aristotle." Suppes viewed the truly revolutionary function of computers in education to lie in the then novel area of CAI. CAI presented a powerful logical argument, the possibility of individualization, a perennial educational quest. The skeptic may recall that, no less a figure than Thomas A. Edison proved the fallibility of educational prophets by predicting some seventy years ago that motion pictures would find their primary function in the classroom and would revolutionize the educational process.[2] The historian of higher education could, however, provide ample evidence that the classroom teacher has not enthusiastically nurtured technological innovation in his/her domain.

This paper considers the Computer-Assisted Instruction (CAI) experience at a small/2000 undergraduates/comprehensive college in relationship to a stage theory.* Richard Nolan developed the stage hypothesis, explicated in his article: "Managing the Crisis in Data Processing."[3] He considers the evolutionary process in business from management of the computer to management of total data resources. His focus is upon data processing in a business setting. Positing six stages on a continuum from initiation to maturity, Nolan analyzes the process of data processing growth in companies and provides the manager with information requisite to plan for and manage imminent and future growth.

*The definition of CAI here is stipulated: any instructional application of computers such as drill, tutorial, demonstration, simulation, instructional games and problem solving.

As indicated this paper considers CAI in relation to stage theory. Nolan's hypothesis is available providing terminology, framework, and insights. The instructional component of education, however, is not analogous to the business enterprise. The objectives, motives, resources, pressures and professionals involved differ considerably. The nature and sociology of the teaching profession, particularly with respect to technology, differ greatly from that of the business world. Chalk and talk jibes more with training; the dominance of the text is solidly established. Few rewards for innovation exist and theoretical knowledge of the advantages of CAI seems minimal. Historically, education has never been in the vanguard of technological change.

The purpose of this paper is to categorize and describe the stages of growth of CAI at a particular institution. This history, capable of generalization, provides, though not neat, tidy, and discrete packets, the outline of identifiable stages of CAI growth. To exploit the potentiality of CAI, to assimilate this new method of instruction, requires knowledge and management skill. Considering the characteristics of each stage may offer insight into the evolution of CAI and infer techniques for influencing and stimulating CAI development. The observations and conclusions may be important for providing clues as to how CAI ought to grow and what might be done at each growth stage. The computer has been on the educational scene for several years, at my institution since Fall 1976. Experiences over these seven years provide a history that can be reflected upon and analyzed and serve as the basis for evolving a strategy. Deeper understanding of a process can prove instrumental in the future growth of CAI.

The content of this paper is based upon personal CAI experiences over the past seven years. In virtually all of my classes I have used CAI in its various modes. Of greater significance, the experience of formally observing and evaluating the CAI work of my colleagues has furnished the opportunity to broaden an understanding of CAI. During each of the past three years a colleague and I have evaluated the results of an NSF CAUSE Grant designed to implement the computer as a useful teaching/learning tool. The yearly reports, primarily quantitative and statistical, described details and assessed individual CAI projects in several academic departments. To indicate the scope of the project over a two year period (1979-1982) 38 courses enrolling 591 students participated. During each of the years students responded to an extensive questionnaire both prior and subsequent to their CAI course experience. In addition, each faculty member reported on factual (eg., programs evaluated, used, written, documented) as well as evaluative areas such as course content analysis, changes in course due to computer usage, effects on student learning and activities, changes in interaction between students and faculty, and faculty activity.

Initiation is the term Nolan uses to identify the first stage of computer growth. What are its contours in education with reference to CAI? Typically, as well as at my institution, the computer invades education through the administrative route, economics the catalyst. Computing power can handle very effectively the set of labor intensive operations that form the necessary on-going business applications of the educational enterprise - employee payroll, grade reporting, student records, employee records, scheduling. Computing on the campus as this stage means performing these repetitive tasks that demand speed, accuracy, and tireless attention. The management of the computer is technical. Only a small percent of the faculty are able to comprehend the jargon much less consider applications to course work. There is very little realistic thought of planning for CAI. The computer center is psychologically remote. By and large the potential users of CAI, i.e., students and instructors do not interact with the computer. There are exceptions in that the computer is used, but more as an object of study as the expansion of computer language courses begins to appear in the catalog. At Merrimack College this stage began in Fall 1976 when a DEC PDP 11/70 timesharing computer was purchased, not without campus critics. The college catalogs for 1976-1977 and the previous three years cited that the computer center is located in the Student Union Building "with remote terminals planned for the campus." The subsequent catalog proudly stated: "The computer center is equipped with a Digital Equipment Company PDP 11/70 running under RSTS/E.... Terminals are installed in each classroom building, the library, and Austin Hall, thus according easy and convenient access to the computer." Stage one of educational computing is accomplished.

Contagion, a term borrowed from the medical lexicon, is the second stage in the Nolan paradigm. While it may seem to imply a widespread proliferation, this is not the case. Enthusiasm is superficial. A very small number of faculty at the college "caught" the computer "bug". For example, in the humanities one professor experimented briefly with writing CAI lessons which were never implemented. In the social sciences one professor wrote and implemented in class a small set of CAI lessons. In the most extensive course applications, a physics teacher wrote and used, experiencing, however, major problems, four lengthy CAI lessons in conjunction with his Physics I and Physics II courses. In each of the classes cited, the programs were written not in a higher level programming language such as BASIC, but in a CAI author language, DECAL, capable of being adequately learned in three or four hours of time and requiring no computing background. Manuals for DECAL were distributed to those few faculty members who initiated interest, though no formal education of users, i.e., faculty took place. A few faculty, 6 in number, not intimidated by mysterious terminology and the assumed hazards of mathematics formally enrolled in language courses taught by their colleagues in computer science. In addition, the management of the computer center did procure teaching packages from DECUS (Digital Equipment Computer User Society) and the software vendor CONDUIT. Most of the faculty were unaware of the available software as no effort was made to catalog and publicize acquisitions. In retrospect, the advance of CAI and the education of faculty in quanitity and intensity could have been achieved at minimal cost in time and money had imaginative efforts been made to establish a genuine climate of enthusiasm: for example, a committee on CAI, a listing and description of available computer programs, a demonstration lesson of the Author language, a brief training session for potential DECAL users, a CAI newsletter, etc. The sociology of the teaching profession reveals a lack of colleagueship. Teachers work in solitude in which professional knowledge, i.e., technique, is not freely communicated, one significant reason for the backwater status of technology in education. Any quality endeavor or activity encouraging pedagogical professional colleagueship reduces resistance that springs more from ignorance than doggedness.

Control is the next stage in the Nolan hypothesis; aspects of which can be seen in the growth of CAI. At Merrimack the need for formalized plannning and control was evident if computing was going to become significant as a teaching/learning tool. Perceiving the values of CAI, those responsible for computing on campus, particularly the director of the computer center, turned some of his energies toward planning and educating the faculty concerning CAI. The main instrument was a grant proposal. An NSF CAUSE Grant provided both the structure and the funding for this growth. In a short time it enhanced and stimulated CAI at the college but even without this catalyst this stage and the subsequent one, integration, would have eventually occured, though later in time and with much greater difficulty.

In accord with Nolan's paradigm periods of organizational "slack" and "control" alternate at the various stages. This was a period of control with formalized planning, articulated objectives, accountability and feedback from evaluators and users (students and faculty) who assessed the efficacy of individual CAI projects. While a grant facilitated this stage of control at Merrimack College, the recognition of the need for central planning, for a blueprint for growth, accountability and particularly user education was realized and motivated the grant proposal. The grant was the vehicle that facilitated growth in CAI; however, it was not a necessary condition.

According to Nolan's typology during mid-stage three businesses evidence a turning point, a transition to management of data resources from management of the computer. Concerning the growth of CAI, a transition of equal import also occurs, heralding the fourth stage, aptly named integration. At this juncture the external dimensions of the computing activity is weaved into the other experiences of the course, considered as parts of an entity judged as a whole. While in previous stages several courses had CAI components, they were often "add-ons", more often than not optional. Lectures, term papers, assignments, and labs were integral to the course, each contributing to articulated objectives and part of the course fabric. The computer segments in many courses were extras, hence "add-ons". The course had not been rethought, as it were, with the CAI lessons integrated. Computer lessons designated in many cases as optional were viewed by students in a manner similar to "suggested readings". In the competition for student time and energy optional activities were squeezed out and ignored. This was particularly evident if other segments of the course were evaluated and graded, while the computer component was not treated in this educationally expected manner. However, in those courses that had turned the corner, evolved to this integrated stage, computing was essential to the course structure. The evaluation for CAI in 1979-1980 noted the following:

> It does appear that CAI must be an integral part of the course in order to be successfully utilized. It need not, however, be a large segment of the course. Students must recognize the application, not as a use of the computer itself, but as a useful way to deal with the course material. More successful applications result when the computer component is a genuine component of the course design included to achieve specific course objectives. Interestingly even the optional programs in courses this year seemed to achieve great success. Chemistry, physics, and math all had optional programs used by a significant number of students and rated rather highly in many categories. These programs seem to fit the rule that students must view the applications as a useful and bene-

> ficial way to deal with the content of the course. The felt need for more practice, the confidence achieved by working examples, the opportunity to review or relearn fundamental concepts, these may have contributed to the success of the optional projects. In one course too, students could get a diagnostic evaluation of their work. The optional lessons were then not add-on but an integral part of the course at least for some students for whom they provided a valuable individualized learning experience.

There is also evidence that some faculty reconstructed their courses addressing questions concerning where in the curriculum the computer could be used, not because it is available, but because it is a better way, a way to provide a learning experience for students that is of high quality, either conjectured or demonstrated. For example, one professor who had integrated 10 programs into her courses reported:

> "I could use a full time programmer for all my ideas. It has been on the job training for me. I have appreciated the time to be imaginative in utilizing the computer in my courses. I have only just begun in realizing the potential of the computer for computer-assisted instruction."

According to faculty expression the computer provided greater depth in some courses, more realistic problems, or promoted individualization attending to special needs. One professor noted a serendipitious result of CAI. The computer lessons increased the time and quality of his interactions with students. He notes:

> "An interesting effect here is that the CAI has increased my interaction with students. They are constantly coming to me with CAI problems they have difficulty solving. I encourage this procedure. I have a very good grasp of student progress as well as knowledge of which students are properly doing their work. I like CAI for this reason because I can keep after those not meeting the class requirements."

Expectations would postulate that CAI would diminish time and interaction as students learned concepts at the terminal. However, CAI experiences raised questions in the minds of students; questions later discussed with the instructor and at a more sophisticated level.

Another indication of being located in this stage of integration is the emphasis on documentation. There was a consolidation with fewer new programs utilized. Most of the faculty using CAI turned their attention to preparing manuals for student use and documentation of their programs, the objective being to interface the computer component more intimately into the fabric of the course.

Integration of the computer into the curriculum was not, of course, uniform from department to department or course to course. It is certainly not the main interest or priority of most academics. In addition, faculty members using the computer materials are at different stages of computer fluency. For some computing is a competency demanded by the discipline, thus a significant segment of their educational background and experience. On the other hand, some faculty find computing a relatively new adventure, one that is competing with other teaching demands. As with any new medium, CAI requires adjustments to the behavioral and programmatic regularities of teachers. Also negative attitudes, a synthesis of fear, misunderstanding, skepticism and ignorance arise and attitudes are crucial to successful integration. For example, the expressed opinion of professors of one department who agreed to use CAI lessons in the multiple sections (7) of an identical course, was summed up by a colleague:

> "As a matter of fact, the degree of interest and enthusiasm shown by the instructors in the course sections using CAI ranged from strongly negative to only moderately positive attitudes."

Another professor laments:

> "No guidance, no encouragement, no information - though I might have found such things has I searched further."

In such an individualistic enterprise as teaching it cannot be expected that every professor will agree with the statements expressed to Time Magazine, responding to the selection of the computer as man of the year:

> "Computers! Bah! But you have made me see the print-out on the wall, I will have to learn to use the contraptions."

To complete the picture, a description of the final stage, maturity, is necessary. From the experience of this institution the lines cannot be drawn since no course has yet achieved this stage of evolution. However, in broad outlines, a campus in which CAI has reached maturity might be described as a college in which students would expect to have a computing experience in many of their undergraduate courses taught by a computer literate faculty. These experiences, in a variety of disciplines, would enhance coursework and the quality of undergraduate education. The prophecy of Suppes, though late in realization, would be achieved.

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PREREQUISITES FOR AN INTERNATIONAL
EXCHANGE OF COMPUTER-RELATED TEACHING TECHNOLOGIES
THE X .25 PROTOCOL

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INTRODUCTION

For nine years participants in the IUT conference have met to exchange problems and solutions related to contemporary challenges facing the world's educational systems. Often the most lasting and impressive contributions offered come not at the conferences themselves, but in follow-up meetings, conversations, and correspondance as initial contacts are expanded into an ongoing communication process. Through the links created at IUTs, faculty members and administrators have been able to share ideas, syllabii, course materials, and techniques well beyond the limits of the five day meetings.

Focusing on technology, this continuum of exchange intensifies in importance. World economic and technological disparities make it difficult or impossible, and probably undesirable, for separate nations to develop in parallel identical systems. It is far more expedient, particularly in relationship to computer-oriented teaching tools, for a forum like IUT to serve as an exchange center where participants can trade CAI and CMI programs. If a faculty member who has designed a teaching program for a philosophy curriculum can exchange it for a computer managed program useful in arranging tutoring, everyone can benefit with minimal cost or effort.

In technological areas, however, such an exchange is often hampered by purely physical limitations. Computers can connect across the world via phone lines, but such connections are of extremely limited value if the computers themselves are incompatible electronically. Until very recently, such complications made useful connections difficult and infrequent.

THE PROBLEM

Differing electrical cycles, connector types, modem designs, compiler versions, and languages make it highly unlikely that a simulation written for an American Univac 90/70 will run successfully on a German Volkscomputer without an elaborate and expensive translating routine. The lack of either a system of standardization or a readily available connecting device makes effective sharing of software a problematical accomplishment. Without some sort of translator, cooperation is stymied.

One of the most interesting fictional inventions of American television culture in the last few decades is the "Universal Translator", a standard piece of equipment on Star Trek's spaceship "The Enterprise". Using the Universal Translator, Captain Kirk or his designee could, with suspense building degrees of success, communicate with whatever strange creatures or cultures were encountered while "boldly going where no man has gone before".

In the most less exciting and dramatic world of reality a similar Universal Translator, capable of bridging linguistic and cultural gaps rapidly and effectively, has tremendous potential. Particularly in technological fields, where internationalization is rapidly becoming a fact of life, a reliable method of assuring clear and accurate understanding is a prerequisite to effective interaction.

To some degree the computer is emerging as our closest approximation of the Universal Translator, and while it is somewhat less than universal in its abilities, the modern computer system can provide the necessary communication base to overcome obstacles of logic and language that differentiate cultures and frustrate effective interaction.

In teaching, effective sharing of technological innovations requires some sort of "Universal Translator" of a different sort. The IUT, for example, uses English as a universal language, and human communication problems are minimized. But even among persons representing countries speaking the same (or related) native tongues, computer communication may not be possible. Electronic and system differences may make communication between American computers and British, French, German, or any other computer system all but impossible.

SOLUTIONS

As budgets shrink and technological options expand, universities will rely increasingly upon effective information systems to handle tangential and essential educational tasks. Here, again, effective technical communication is a key component to success. Computers have the major advantage of sharing a common logic system, an advantage often not possessed by diverse cultures. Despite the commonality of logic, though, two difficulties exist. Many programs and systems operate in languages that may not be familiar to sister systems in other countries. For example, while COBOL is still a major business in the United States, most European computer programs are written in a language called ALGOL. BASIC and PASCAL, growing in popularity in the U.S., are much less widely accepted in Japan, Germany, and France. Obviously, the packages written in these and related languages, suitable for model building, teaching, decisions, or statistical modeling, are far from international.

Yet computer language converters, called interpreters, are available and can often be used to make systems operating on diverse languages compatible. In much the same way a bilingual person can help an English speaker communicate with a Russian speaker, an effective interpreter can help a COBOL program share data compiled in an ALGOL system.

It is the second major international computer communication problem that has caused so much difficulty and such long delays. A clear human analogy is lacking for the electronic communication problems that make it nearly impossible for two computers working at different speeds, with different electrical systems, and different component wiring to interact. The differences are almost as dramatic as those encountered if a person capable only of human speech tried to communicate emotively with a "cloud creature" restricted thought transference. The two systems simply don't mesh.

Recently an international agreement provided the first giant step toward the Universal Translator. Dubbed X.25, this agreement spells out a protocol for linking computers of different designs, manufacturers, and purposes. The X.25 protocol stands as a potential solution to the problem of international communication among computers, and provides the possibility for the manager of an international business to interact via computer line with branches or customers regardless of the original configuration of the machines involved. Of course, each machine must be "fluent" in X.25 for the system to work, but more and more of the machines being sold and distributed are, providing a potential international business network.

Using the X.25 protocol, a university based in New York can trade programs with colleagues in Brussels, Bologna, and Berlin directly through linked computers. Establishing simulation, CAI systems, and educational management programs, the users in one school can effectively interact with other faculties internationally. Errors of linguistic translation, of colloquial meaning, and of cultural nuance can largely be ignored, since each local system can be programmed to accommodate individual variations. The computers can, in effect, communicate directly with each other, self-translating, interpreting, and interacting as necessary.

Within the past six months International Telegraph and Telephone (ITT) has announced the commercial availability of a device capable of converting signals to the X.25 protocol. Other companies are expected to release equivalents in the near future (quite possibly by this publication). These innovations will allow computers not built to X.25 standards to interact with more modern counterparts, making a universal computer communication possible.

CONCLUSIONS

International conferences provide a forum for cooperation and exchange as well as reporting. With the X.25 protocol, the exchange of computer programs, simulations, teaching systems, and related educational technologies is a reality. With it, the possibility of IUT becoming an international clearinghouse is a real potential, well worth the exploration.

In his essay Cybernation and Culture (1966) Marshall McLuhan told the joke of the mouse being chased by a hungry cat. The mouse finally hides in a hole, waiting for the cat to grow tired and move away. After awhile, he hears an "Arf, arf" sound and, assuming the family dog has chased away the hungry cat, ventures out. The stalking feline grabs the poor mouse, and smiling through his whiskers, purrs, "It pays to be bilingual". In much the same way, the X.25 protocol provides the bilinguality that allows computers to communicate across cultures, serving as the Universal Translators international businesses so sorely require.

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TEACHING WITH TECHNOLOGY - DEMANDS AND DEVELOPMENTS

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Introduction

Technological advances during the last decade have provided vastly increased numbers and kinds of hardware and software that offer the possibility of revolutionizing the university teaching. How to use this new technology is receiving increased attention in the literature.(1)

This paper describes advances, particularly in interactive color computer graphics, being utilized in order to improve teaching in the Mechanical Engineering-Engineering Mechanics Department at Michigan Technological University. It also reports on a study of some of the social dimensions of such teaching, especially the attitudes and perceptions of the faculty toward use of technological devices in teaching.

Academic Environment

Michigan Tech is a state university with 96% of its students undergraduates. Two thirds are in engineering curricula. The remainder major mainly in business, science, or forestry. The University has fewer than 8,000 students but its engineering school is among the largest in the United States.

Faculties who teach technologically oriented subjects should be receptive to the use of technology in education. This is not always the case, however computers and microprocessors do hold a high priority in education at Michigan Tech. Substantial investments of money and effort have been made to obtain and make use of a wide variety of sophisticated computational equipment. The department, whose activities and attitudes are the focus of this paper, has taken the lead in using computers in its curriculum. No attempt will be made, however, to describe the considerable efforts in CAD/CAM at MTU. Rather, the focus will be on interactive color microcomputer graphics sequences being developed for the sole purpose of improving instruction.

Potential for Teaching Enhancement

The transmission of information and understanding of concepts and ideas are paramount in education. The chalkboard is probably the main vehicle used to communicate words, mathematical relationships and graphic material but sometimes overhead transparencies, slides, films and video are also used.

Shortcomings in teachers' draftsmanship and artistic talents, time constraints associated with drawing on the chalkboard and the inflexibility of film encourage the use of visible, understandable, colorful, dynamic and interactive alternatives of presenting graphic information to students individually and in groups. Large screen projection now enables us to cost effectively replicate in the classroom what had previously been available only through single graphics work stations.

The authors and their colleagues have developed computer programs to present engineering principles and concepts more interestingly and effectively than before. Short sequences are inserted as a part of class presentations. The power of color graphics can quickly clarify points which otherwise remain obscure to all but the most perceptive students.

Classroom Sequences

Interactive color computer graphics sequences have been developed for several courses, some using animation to help the students visualize motion. Kinematic quantities like velocity and acceleration are shown as colored arrows which change in length and direction as a body moves. Such eye catching graphics help students associate abstract concepts and relations with movements that are tangible and understandable.

In illustrating the motion of a point along a spiral path the instructor inputs values of various parameters and the computer displays the vectors representing velocity and acceleration of a point as it moves along its path. He can cause these quantities to be displayed in any one of three coordinate systems to show the distinctions and advantages of each system. Fig. 1 shows one view of the spiral sequence. Dots show the path while colored arrows represent the velocity and acceleration.

In another course, the computer generated color graphics enable the instructor to bend and straighten a beam on the screen

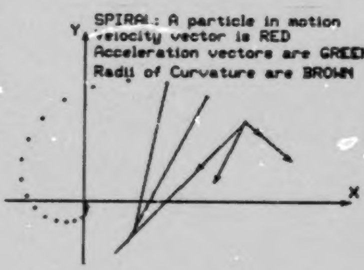
SPIRAL: A particle in motion
velocity vector is RED
Acceleration vectors are GREEN
Radii of Curvature are BROWN
Y
X

Fig. 1. Display from "Spiral" Sequence for Dynamics Course.

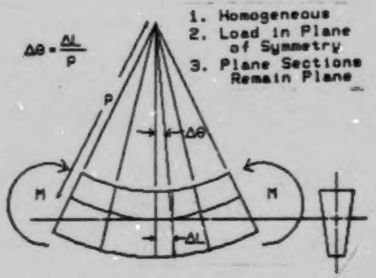
1. Homogeneous
2. Load in Plane of Symmetry
3. Plane Sections Remain Plane
$\Delta\theta = \frac{\Delta L}{\rho}$
ρ
Δθ
M
M
ΔL

Fig. 2. Display from "Bending " Sequence for Mechanics of Materials Course.

while the class watches. Using a series of animated sketches with windows which display alphanumeric expressions, an important formula is derived quickly, efficiently and convincingly. Key assumptions on which the formula is based are introduced and presented as the need for each arises.

Fig. 2 shows one stage of this derivation. Two assumptions, the beam, and some symbols used in the analysis are displayed. At several different steps in the derivation, what is displayed on the screen is reinforced by hard copy handouts which becomes a part of each student's notes.

Development of The Software

The applications software described here is produced through the joint efforts of four team members. A computer graphics specialist assists faculty members in implementing their ideas along lines that are consistent with the capabilities of the system. He also guides an engineering student, who is familiar with the subject matter being presented, in writing the detailed program Experience with three member teams has convinced us to add a computer science student to help in the development of more efficient algorythms, coding techniques, and documentation necessary to maintain the programs developed for future use and possible modification. A more detailed description of the development of application software and a listing of one of the programs are presented in Reference 2.

Time Investment

It should also be noted that each member of the project team invests a significant amount of time in the development and production of new "tools" or interactive programs. The actual time required is different for each project. It is necessary to make an open ended commitment of whatever time and effort is required for that first project. Experience provides a basis for predicting the time required for the various types of projects.

Hardware

The hardware used for the applications described above consists of a Cromemco microcomputer system with a color graphics interface with two frame buffers for animation capability. The resolution of the output is at two levels, a medium resolution of 241 x 378 with sixteen colors from a palette of 4096 choices and a resolution of 482 x 756. The graphics output is RGB + S and can be encoded to a RS170/170A NTSC video composite. The system can be externally driven (sync) which enhances the ease of recording encoded computer generated images directly on video media. This system is coupled with a V-Star 4 large screen projection system which can front or rear project bright images of up to 20 feet diagonal measure. The hardware is identified in more detail in Reference 3.

Attitudes of the Faculty

The way in which new technology becomes a part of "normal" teaching procedures and the rate at which it is adopted depends not only on the availability of the hardware and software but also on the way the faculty perceives its usefulness. Some feel threatened by the very existence of technology with which they are not familiar and choose to ignore its potential rather than adapt to the changes required to utilize it.

To assess what barriers faculty attitudes might pose to fuller utilization of technological advances in university teaching, a series of interviews were conducted. In each interview, the purpose of the study was explained and the way in which experience and attitudes were to be codified, Table 1, was discussed. The list of technologies given in Table 2 was examined and the number corresponding to each respondent's experience and/or attitude was recorded.

Table 1. Classification of Experience and/or Attitudes of Faculty toward Technological Devices in Teaching

Have used but not doing so now:	1. Often
	2. A few times
Currently Using:	3. Often
	4. Now and then
Have never used but might try:	5. Eager to
	6. Open to
Not suitable for my teaching:	7. Really wouldn't fit
	8. Useful but too much trouble
9. Not suitable for any teaching	
10. Uncertain	

The list included a real newcomer, computer graphics, emphasized in this paper, but also encompasses technologies that are far from new. Movies, for example, have been available since before most present educators were born. Television dates back to the early 40's but availability of high quality low cost video recording equipment represent new technology.

Twenty four of the forty professors in the department were interviewed. The respondents, selected on a random basis, ranged in age from 33 to 62 and taught subject matter covering the

Table 2. Faculty Experience and Attitude Toward Technology

	Frequency of Response*									
Television	1	2	3	4	5	6	7	8	9	10
Purchased programs		3	3		3	12	3			
Tapes developed by others at MTU		2			2	16	3	1		
Own tapes	1			2	5	8	3	5		
To replace live teaching		1				5	16		2	
Segments to enhance lectures			2	2	6	12	1		1	
Use by students outside class	1	1		1	5	15	1			
Computers										
Usual Computer Facilities										
CAI - computer assisted instruction			1	1	1	14	4	1		2
Student use computer for computations	1		8	5	1	1	7			
Access to data through the computer			5	4	1	8	6			
Library search via computer	1	6	2	6	4	3	2			
Computer Graphics										
Segments to enhance lectures	1		4		5	12	7			
Segments for student use outside class			2	1	2	17	2			
Scheduled use for CAD/CAM/CAE		2	5		1	6	9			1
Microprocessors										
Monitor and control instrumentation			6	2	6	5	5			
Collect data			6	2	6	5	5			
Process Data			6	2	6	5	5			
Student Use										
Students write own routines	1		12	4	1	2	4			
Students use routines already written	1	1	10	1	1	3	6			1
Software										
Purchased graphics software for micros to meet specialized needs			3	2	3	12	4			
Develop graphics software for micros to meet specialized needs			6	3	3	7	4	1		
Other Audio Visuals										
8/16 mm movies to supplement lectures	2	8	1	6	2	5				
Slides-to illustrate lectures	1	2	5	8		6	2			
Slide-tape sequences-to supplement lectures	1				1	17	4		1	
Overhead transparencies										
-to illustrate lectures	1	3	10	7		1	2		1	
-to replace blackboard	1	1	6	2		2	10		2	

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*Column headings refer to classifications of experience and/or attitudes identified in Table 1.

entire spectrum of department's course offerings.

The results are presented as frequencies in Table 2. The numbers in each column represent the number of respondents whose experience and/or attitude correspond with each category from Table 1. Categories 1-4 indicate current or past use and 5 and 6 indicate a willingness to try the given technology. Categories 7, 8 and 9 were the primary indicators of reluctance to use the "new" technologies. Use in the past (1 and 2) but not in the present could reflect disenchantment from bad experience but that interpretation was not supported by comments in the interviews.

The frequencies of responses recorded indicate a generally favorable climate for utilization of technological advances in teaching in the department. The interviews seemed to bring out only two significant deterrents to faster and fuller utilization of technological advances. The primary deterrent was heavy teaching loads which cause pressures that lead to postponement of efforts to learn about and develop techniques and strategies for utilizing the new technologies. The trade off of effort required to implement new technology and any increase in productivity that might provide relief in teaching load is difficult to assess.

The second deterrent was also related to time. With the University at a stage in its development where research productivity is receiving heavy emphasis, several respondents perceived that University priorities were not consistent with extensive efforts in teaching innovation.

CONCLUSIONS

Application of interactive color computer graphics sequences to teaching of engineering subjects at Michigan Technological University has been successful. A team approach has made it possible to develop high quality programs and the hardware and software needed has been assembled at an affordable price.

In combination with appropriate handouts, the graphics has proved to be a helpful addition to lectures and well received by the students. Interviews with faculty members reveals that they consider the University to be supportive of the development and utilization of technological advances in its teaching effort, especially in areas related to computers, and that they are not only moving rapidly in that direction but are open to broadening and accelerating those efforts as time permits.

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THE PROFILE OF A RECOMMENDED INSTRUCTOR: POSSIBLE SUGGESTIONS FOR THE FUTURE

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PROBLEM

The research literature on student ratings has become quite extensive in recent years. The growing interest in this issue stems from methodological and economic considerations. First, findings indicate that student ratings are generally found to be reliable and valid indicators of instruction quality (Kulik and Kulik, 1974; Kulik and McKeachie, 1975; McKeachie, 1979) to cite only a few. Second, due to recent worldwide economic develoments, universities have undergone major budget cutbacks resulting in competition for students and for scarce faculty positions (Goldschmid, 1978; Gross and Small, 1979; Hamilton, 1980). As a result, contemporary students, it is argued, have taken new roles: those of consumer and investor (Goldberg, 1981: 16). Now, more than ever, instructors and administrators will have to be more responsive to student needs. The major premise of this study is that responding to students needs can help instructors and administrators in making efficient institutional adaptations to existing and potential market demands.

The present study is an attempt at identifying students' preferences and priorities with regard to instruction. It is designed to ascertain the profile of the instructor whom the students recommend to each other. Operationally, the study seeks to assess the specific aspects of instruction as perceived by students which significantly explain the variance in recommended instructors. This assessment will provide instructors and administrators an insight into students' preferences and priorities in instruction.

RESEARCH PROCEDURES

(a) Instrument

Data were collected with the aid of questionnaire: Q.1. "Evaluation of Instruction by students". This questionnaire consisted of 22 items drawn from a large number of such widely used questionnaires. The items pertain to the two following aspects of instruciton serving as independent variables: Content and challenge and teaching techniques. The independent variable was measured by the following item: "You would recommend this instructor to fellow students". Items were cast into a 5-point scale. The students were asked to indicate the extent to which their instructors employed each item in the process of instruction. Low scores indicate low extent of employment, whereas high scores indicase great extent of employment. (For item wordings, means and standard deviation, see Table 1).

(b) Population

Five thousand and three hundred students enrolled in 302 courses, evaluated their instructors on Q.1. during the fall semester of the 1981/82 academic year in the University of Haifa.

METHOD OF ANALYSIS

In order to determine which configuration of items explains most of the variance in recommended instructors, stepwise regression analysis was carried out. In order to detect possible effects of students' academic affiliation on recommending instructors, separate regressions were carried out for the School of Social Sciences and the School of Humanities.

FINDINGS

The R^2 values generated by the regression equations were as follows: $R^2 = .58$; .78; .57 (total sample, School of Social Sciences and School of the Humanities, respectively). Thus, the totality of the items in the individual models explained between 57 to 78 percent of the variance in the different groups (See Table 1). Yet, there are specific differences, due to academic affiliations, as can be seen in Table 1, and we shall identify them briefly:

(a) Total Sample

The general profile for the recommended instructor in this group shows that he creates the feeling in his students that have become more knowledgeable in the issue ($\beta = .23$; $p = .01$), structures his lectures well ($\beta = .20$; $p = .05$) accommodates students' needs and interest ($\beta = .19$; $p = .05$) stimulates the interest of his students ($\beta = .17$; $p = .05$) and that he incorporates periodic integrative presentations ($\beta = .15$; $p = .05$).

(b) School of the Social Sciences

The general profile for the recommended instructor in this group shows that he accommodates students' needs and interest ($\beta = .29$; $p = .01$) structures his lectures well ($\beta = .23$; $p = .05$) creates the feeling in his students that they have become more knowledgeable in the issue ($\beta = .20$; $p = .05$), incorporates periodic integrative presentations ($\beta = .18$; $p = .05$) and that he stimulates the interest of his students ($\beta = .14$; $p = .05$).

(c) School of the Humanities

The general profile of the recommended instructor in this subsample shows that he stimulates the interest of his students ($\beta = .35$; $p = .01$), creates the feeling in his students that they have become more knowledgeable in the issue ($\beta = .31$; $p = .01$) and that he structures his lectures well ($\beta = .18$; $p = .05$).

The left side of Table 1 presents the mean scores of 22 items included in the study representing the students' perception of the extent to which these items were employed by the instructors in the process of instruction. Note that the mean scores, of all items comprising the three configurations identified by the regression anayses, are less than 4.00.

DISCUSSION

The comparison of the list of items regarded to be related to recommendation of instructors with those that are indeed found in the analyses, indicates that only items referring to content and challenge have significant effect on recommending instructors. Furthermore, the three profiles of recommended instructors are not only made up of items referring to content and challenge, but also made up of almost identical items affecting recommended instructors in the same direction. The priority of the student at the University of Haifa, as suggested by the data, lies with content and challenge rather than with teaching techniques. This priority is present in the total sample as well as in the two academic affiliations. However, the multivariate analysis indicates that the content and challenge items which directly affect recommending instructors have different weights for different groups within this priority. Students as a whole prefer instruction which is oriented toward personal developments; students in the Social Sciences prefer instruction which is oriented toward their needs and interest, while students in the School of the Humanities, prefer instruction which stimulates their interest.

Items which were employed to a great extent by the instructors (as perceived by the students) refer to content and challenge as well as to "form" Thus indicating that both aspects are part of instructors' priorities in instruction. The lack of effect of these items on recommending instructors may suggest that within these priorities instructors and students differ in their preferences.

Findings of this study lend support to claims that contemporary students have taken new roles: those of consumer and investor. They seem to prefer instruction which is oriented toward their needs and interest and disregard "form". It is the responsibility of instructors and administrators to demonstrate to students the relevance of "form" in instruction. Furthermore, reviewing students' preferences will help develop in the instructors responsiveness and openness to communication with students. This communication is urgently needed not only due to present and future market forces but also due to the fact that instructor or administrator who has heard from his students, who knows what their arguments and perceptions are, is in a far better position to make rationale decisions than one who has only incomplete information (Goldberg, 1980: 16).

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TABLE 1

Item Wordings, Means, Standard Deviations, the Significant β Correlations and R change in the Stepwise Regression for Recommended Instructor
(Total Sample N=302; School of Social Sciences N=199; Humanities N=102)

	Item Wordings	Mean(SD)	Total Sample β	Total Sample R change	Social Sciences β	Social Sciences R change	Humanities β	Humanities R change
	Content and Structure							
1.	Cleardly defined goals	3.64(.69)						
2.	Presenting content from various aspects	3.65(.66)						
3.	Encouraging independent study	3.40(.65)						
4.	Opening new horizons	2.97(.72)						
5.	Acquiring skills for independent study	3.51(.76)						
6.	Motivation for reading extra-curricula literature	3.59(.64)						
7.	Course stimulated my interest	3.70(.73)	.17*	.01	.14*	.01	.35**	.48
8.	Becoming more knowledgeable in the issue	3.70(.72)	.23**	.53	.20*	.01	.31**	.07
9.	Well structured lectures	3.35(.72)	.20*	.02	.23*	.05	.18	.02
10.	Time was efficiently allocated	4.41(.46)						
11.	Provision for asking questions	3.57(.69)						
12.	Interesting and helpful papers	4.30(.50)						
13.	Periodic integrative presentations	3.76(.67)	.15*	.01	.18*	.01		
14.	Respecting students	4.22(.52)						
15.	Accommodating students' needs and interest	3.94(.65)	.19*	.01	.29**	.70		
16.	Providing for students' opinions	4.11(.55)						
17.	Pleasant atmosphere	4.26(.60)						
18.	Tolerating different approaches teaching techniques	4.24(.52)						
19.	Utilizing wide range of teaching techniques	3.33(.84)						
20.	Utilizing wide range of teaching aids	3.92(.62)						
21.	Clear explanations	3.79(.63)						
22.	Clear and loud lecturing	4.41(.58)						

	Total Sample	Social Sciences	Humanities
R^2	.58	.78	.57
N	302	199	102
d.f.	296;5	193;5	98;3
p	0.05	0.05	0.05
F	120.90	129.75	43.70

*p ≤ .05
**p ≤ .01

THE "GOOD PROFESSOR" AS PERCEIVED BY UNIVERSITY INSTRUCTORS

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Teaching involves making decisions of various kinds--about content, methods and organizations for learning; the basis for the decisions is set by the goals the instructor has in mind for the students to achieve (Harlen, 1981). His goals are determined largely by his perception of teaching and his attitudes toward students. Several studies including Gaff and Wilson (1971), Eckert and Williams (1972), Bayer (1973), and Cross (1977) have examined faculty attitudes toward students and teaching. They have found that most college faculty members consider teaching to be a central and major source of satisfaction. Most view themselves as effective teachers, yet at the same time want to improve their effectiveness.

Although faculty members seldom consciously share instructional theories or methods, in practice they tend to agree on their instructional goals: covering the content of a course and to some extent introducing the concepts and methods of the field. Generally, they have considerably less concern for students' general intellectual and human development. Good teaching is thought to require knowledge of an academic discipline and its current research, an attractive personality, and the ability to motivate students (Kozma, 1977).

The purpose of the present study is to answer the question: What is the Israeli instructor's conception of a "good university professor"--what qualities does he consider desirable? The study deals with the instructor's conception of the characteristics of the "good professor" with regard to the department in which he is teaching. Our assumption was that instructors teaching in various departments would have varying conceptions of the "good professor." Being within the framework of a scientific discipline and a certain professional orientation could influence the attitudes and expectations of the instructors.

Method

Sample

The sample for the study consisted of 51 instructors of various ranks from Humanities and Life Sciences. Sampling was stratified by department. Each contributed its proportionate share of participants.

Instrument

A list of 15 "good university professor" traits served as the tool for this study. Prior to the study, instructors were asked to indicate one or more characteristics of a "good university professor." Fifteen most frequent were chosen for our study. From these the participants were asked to choose the three most important characteristics of a "good university professor." The characteristics listed were related to four aspects:

1. Scholarship - professor's research ability and knowledge.
2. Delivery - preparation and organization of lessons, interesting presentation of material, development of student motivation.
3. Advising - student-instructor interaction, willingness

to help, friendly relationship.

4. Instructor's personal traits - a sense of humor, external appearance, and fluency of speech.

Results

How do instructors conceive of a "good university professor?" Instructors' selections of the three most important characteristics of a "good university professor" are presented in Table 1. The figures in the table indicate a tendency on the part of instructors to attach relatively great importance to characteristics related to educational objectives. The two traits which received the highest number of choices were: (1) ability to stimulate intellectual curiosity, 22.2% and (2) develops thought processes, 15.0%. A "good university professor" is first and foremost a person who awakens intellectual curiosity and stimulates thinking. An additional characteristic often mentioned was preparation and organization of lessons. This relates to the method of instruction and presentation in class. The fact that the trait: gives attention to student feedback was chosen, although at a relatively lower frequency, shows that, to a certain extent, instructors expect that a "good university professor" will be able to interact with the students within classroom situations. Professor's traits which are relevant to his academic status such as research ability and knowledge of the material, were chosen with a low frequency. Only a very small number of the subjects noted qualities related to the professor's personal attributes such as friendliness or sense of humor. Flexibility and external appearance of the pro-

Table 1

Distribution of Choices of "Good University Professor" Characteristics by Department (Percentages)

	Characteristic	Humanities N=90	Life Sciences N=63	Total N=153(*)
1.	Ability to stimulate intellectual curiosity	25.6	17.5	22.2
2.	Develops thought processes	10.0	22.2	15.0
3.	Preparation and organization of lessons	8.9	19.0	13.1
4.	Attention to student feedback	11.1	12.7	11.8
5.	Develops motivation	13.3	7.9	11.1
6.	Research ability	8.9	3.2	6.5
7.	Knowledge of material	5.6	6.3	5.9
8.	Interesting presentation of material	7.8	1.6	5.2
9.	Lucid expression of ideas	2.2	3.2	2.6
10.	Friendly approach	4.4	0	2.6
11.	Willingness to help	0	3.2	1.3
12.	Fluency of speech	0	3.2	1.3
13.	Sense of humor	2.2	0	1.3
14.	Flexibility	0	0	0
15.	External appearance	0	0	0
	Total	100.0%	100.0%	99.9%

(*) Only those participants who chose three characteristics were included in the analysis; the number refers to the number of choices and not to the number of subjects.

fessor is not seen as an essential to good teaching.

How is the "good university professor" conceived of by instructors in the various departments? The findings set forth in Table 1 indicate that, with regard to the selection of characteristics that are important in a "good university professor," the choices of instructors in the humanities were: (1) ability to stimulate curiosity, (2) developing student motivation, and (3) gives attention to student feedback. Life sciences instructors chose the following with relatively greater frequency: (1) developing student thinking, (2) preparation and organization of the lessons, and (3) ability to stimulate intellectual curiosity. In the humanities, the "good university professor" is mostly a person who awakens intellectual curiosity, stimulates motivation and interacts with the students. The instructors in the life sciences think of the "good university professor" as a person who stimulates thinking, is well prepared for the lesson and awakens intellectual curiosity.

Regardless in which department the instructors are teaching, they chose with relatively low frequency or did not choose at all, those professor's traits, which are related to his personal attributes.

Discussion and Conclusions

The "typical" instructor in the sample sees the "good university professor" first and foremost as a professional person capable of developing thinking processes and stimulating intellectual curiosity by interacting with the students. These findings do not tally with the conception of students from the same university (Miron & Segal, 1978). The students see the "good university professor" as a person capable of transmitting material in an organized and interesting manner. A disparity exists between the instructor's conception of the "good professor" and the students' conception. This must be taken into account in determining standards for the evaluation of teaching quality. On one issue instructors and students do agree: the professor's personal attributes are not considered essential to the competent performance of his role.

In this study, there was unanimity among instructors from the two departments in their conception of what a "good professor" should be. This unanimity was expressed by the fact that qualities singled out by instructors in both departments are characteristics that fall under the heading of delivery.

Further, in this study, knowledge of the material was ranked seventh, yet mastery of knowledge is considered of primary importance to "good university teaching." It seems that a solid background as well as familiarity with new information is obviously essential to "good teaching." The certainty might be taken as self-evident and therefore, ranked in the center of the list.

Our findings do not tally with those of Kozma (1977) who found that faculty members generally have considerably less concern for the student's general intellectual curiosity and human development.

These conclusions must be treated with extreme caution, since the matter was investigated with regard to two departments in one university. Effective university teaching has different connotations for different people at different levels of higher education.

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'THE IMPORTANCE OF THE PHYSICAL ENVIRONMENT AND EDUCATIONAL DEVELOPMENT SUPPORT TO THE UNIVERSITY TEACHER'

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Over the past 10-15 years, interest in adult education, or 'lifelong learning', has mushroomed, particularly with regard to instructional theories, methods and strategies. One factor in the teaching/learning interaction, however, has been relatively neglected, and that is the environment in which this interaction takes place. Bergquist (1977), in a discussion on faculty motivations, acknowledges that, "Teachers at distinguished institutions are dedicated, not to their students, but to their disciplines...their self-esteem being dependent on the esteem of their colleagues". In a context such as this, which is more supportive of faculty members' discipline and research activities, than of teaching and student development, the teaching environment will probably be seen as relatively unimportant.

The literature on environmental psychology, on the other hand, states that the interactions which take place in a particular environment, are affected by the perceptions of those interacting within that environment (Proshansky 1970). If this so, the teacher-student climate will be affected by the perceptions of both teachers and students, as will the whole teaching/learning activity. It follows, then, that the environment will also have an effect on teacher and learner satisfaction.

Research on the effect of the classroom environment on university students and faculty is sparse and of recent origin. Studies by Farrenkopf (1979), Sommer (1980) and Estabrook (1980) all show that university classrooms are rated as less than satisfactory by both students and faculty, and that, in general, students do not rate their classrooms as harshly as do their instructors.

The current study was stimulated by a student classroom evaluation survey in the winter of 1982, when faculty members evidenced personal interest in an opportunity to evaluate their classrooms. This study was developed for the purpose of exploring the value of the teaching environment to university faculty and to compare it with other areas of teaching support. It was hypothesised that, contrary to the impression created by Bergquist, faculty members do care about the classrooms in which they teach, and the study's objectives were to solicit information on faculty attitudes and examine them.

The information from which to study the attitudes of faculty towards the various teaching supports was solicited from faculty members at the University of Guelph by means of the Teaching Support Questionnaire, an instrument designed to assess the importance to teachers of individual kinds of teaching support. The questionnaire consists of 30 questions, each designed to solicit a response from an instructor as to how he or she values various supports to the teaching function, followed by requests for the discipline, status, age range, amount of teaching experience and gender of the respondent. The first ten questions pertain to the teaching activity itself, the second ten to the physical environment in which teaching takes place and the third ten to the supports offered to teachers by the institution. Space is left for comments, both on whether responses would be different for classes of different sizes, and comments on teaching supports in general. The nature of the questions was influenced by Sommer's (1972) contention that the most relevant information is found by evaluating existing conditions, rather than by asking people what they want.

Questionnaires were mailed out to 900 members of the academic community and on the basis of 278 responses, 32.3 per cent of questionnaires mailed, the hypothesis that faculty care about their classrooms, at least as much as other areas of support, was accepted and the items rated in order of frequency of response. One third of respondents also wrote personal comments. Furthermore, although the study was developed to explore faculty attitudes to the physical environment, it is important for the inclusion of comments on faculty attitudes towards teaching supports in general.

The items on the Teaching Support Questionnaire were rated independently by giving each item a score of 1-5 according to its importance as judged by the individual instructor. Categories were: 1 - Of no substantial contribution; 2 - Of little importance; 3 - Of average importance; 4 - Quite important; and 5 - Important in the highest degree. The items were then listed in descending order of importance based on the median point and mode score for each item, and divided into four categories: High Value Supports, Moderately High Value Supports, Average Value Supports and Low Value Supports. (See Figure 1.)

Figure 1.: THE VALUE OF VARIOUS SUPPORTS TO FACULTY

High Value Supports

Opportunity to determine course content
Adequate preparation time
Visual contact with students
Positive attitudes towards teaching (by institution)
Classrooms suitably equipped for audiovisual use
Appropriate and easily available audiovisual equipment
Opportunity for professional development

Moderately High Value Supports

Freedom to select teaching courses desired
Acceptance by institution of new instructional ideas
Adequate time between classes for preparation, etc.
Institutional recognition of teaching by providing opportunities for promotion on the basis of teaching contribution
Classrooms large enough, or small enough to suit the size of the class

Average Value Supports

Optimal heating/ventilation
Satisfactory peer/department interaction
Institutional recognition of the classroom itself as an important part of the teacher-student climate
Adequate office space
Material rewards
Office situated for interaction with colleagues
Personal orientation to department when newly appointed
Availability of funds and other resources for the development of instructional materials
Interdisciplinary environment
Control over class size

Low Value Supports

Recognition of teaching efforts through teaching awards
Control of physical environment
Classrooms conveniently located
Availability of grants etc. for effective teaching innovations
Availability of in-service education
Pleasantly decorated surroundings; colourful furnishings
Windows that open

The six most important items were found to be: "Opportunity to select course content","Adequate preparation time", "Visual contact with students", "Positive attitudes towards teaching" on the part of the university, "Classrooms equipped for audiovisual use" and "Appropriate and easily available audiovisual equipment". The latter three drew a large number of comments, a third of which pertained to the question of audiovisual equipment and another third from individuals who felt that teaching had a low priority in some academic units and were discouraged by this.

The comments on audiovisual media indicated the importance of adequate equipment, well placed and maintained for reliable operation, a condition sometimes lacking in a large institution with centrally located classrooms. Several instructors felt that that an audiovisual system, or at least microphones and amplifiers, was essential for large classes, and cited examples of rooms they considered acoustically bad, having poorly located controls or malfunctioning equipment. The high value placed on audiovisual support suggests that it should be afforded a high priority by the administration, both as to equipment and back up systems, such as good acoustics and up-to-date resource material.

The seven least important support items were, in ascending order, "Windows that open", "Pleasantly decorated surroundings; colourful furnishings", "Availability of in-service education", "Grants for teaching innovations","Classrooms conveniently located", "Control of the physical environment" and "Recognition of teaching ability through Teaching Awards".

The least important item according to respondents on this survey is "Windows that open". Sixty-five per cent of faculty rated this item of little or no importance, while one instructor requested "Windows that open" in his unsolicited comments. This suggests that while they may not be very important for most people, there are some for whom they are very important, and, for these, insulated, air-conditioned rooms may be an anathema.

In the light of the comments concerning the apparent low priority given to teaching by academic units, three "Low Value" items in particular, "Availability of in-service education", "Grants for teaching innovations" and "Recognition of teaching through Teaching Awards" merit further consideration. The low importance accorded to these items suggests several possibilities. It may be due to conservatism and satisfaction with current teaching methods, shortage of time, or lack of motivation to try new techniques engendered by a system which many perceive as indifferent to the teaching function. This reinforces the notion that professional development, which is given a high value, (it placed eighth on the list,) refers to the discipline of the faculty member and not to the activity whereby his/her knowledge is communicated to the students. It also suggests the notion that the term "Professional Development" is development in one's subject rather than development of one's teaching ability. It may be, too, that the term "In-service Education" is equated with teacher training, an activity which may be considered as relatively unimportant by those who see teaching as having a low value in the eyes of the institution. If this is so, then it appears as if faculty members are not interested in activities which do not contribute substantially to career progress.

Each item is not of equal importance to the members of different colleges, although responses were relatively consistent for most items. As may be expected when subject matter ranges from theory to practice, priorities are sometimes different. This may explain why "Availability of funds for teaching materials was rated "Of little importance" or less in the College of Arts, while in the Ontario Veterinary College, where teaching materials are highly visual, dynamic and temporary, 65 per cent of respondents rated this item as "Quite important" or higher.

Opportunity was afforded to respondents to comment on whether and in what way their responses might differ for different class sizes and over one third of respondents took the opportunity of stating their views on class size. The writers' statements appeared to reflect a strong feeling that large classes needed more than average support, particularly physical support such as better heating and ventilation to avoid drowsiness, good acoustics and good audiovisual equipment. It was also considered that large classes needed more thought in design and preparation time and also called for more recognition for teaching. Some teachers found them unsatisfactory, both for themselves and their students. Others, who considered themselves good at teaching large classes, felt that they were given large classes too often. However, at the other end of the scale there were comments that too small classes were wasteful of both money and time. Several respondents felt that class size, course level and type of class should be taken into consideration when rooms are being allotted.

Although the item, "Institutional recognition of the classroom itself as an important part of the teacher-student climate" fell into the "Average Value" category, the number and range of comments on physical supports indicated that it is a valued item, even if not judged so directly.

In addition to the support items which made up the questionnaire, other support items were suggested by the respondents. These consisted mainly of aid to instructors in the form of teaching and grading assistants, clerical services and supplies and, from a few, computer services.

The provision of a wide variety of supports for the teaching function is evidence of the importance of teaching to the university administration. Yet somewhere between the upper administrative level and the teaching level a change in message has been communicated. The picture that emerges from the comments on this survey is of a faculty overworked from large classes for which they have little time to prepare, frustrated from ill-functioning equipment, and somewhat aggravated by what they perceive as a lack of institutional support for the teaching function. It is a disturbing picture. However, when the comments are viewed in the light of the low value placed on Teaching Awards, grants for teaching innovations and in-service education, it would appear that what faculty are asking for in terms of support are not material items but a change in university attitudes such that teaching acquires a higher value. The above items, while being important to a few people, do not form part of the established recognition and reward structure which affects all faculty. Since most faculty members spend most of their time in teaching and related activities, and since the "raison d'etre" of the university is the communication of knowledge to students, it is necessary that some way be found to rearrange priorities for all.

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TEACHER PERCEPTIONS OF THEIR OWN TEACHING STYLES AND PRIORITIES GIVEN BY THEM TO VARIOUS ASPECTS OF THEIR TEACHING FUNCTION.

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Accountability is not a word familiar to teachers in post-secondary courses in the Bombay University, least of all, accountability to the students. When students (or their parents) pay fees and governments subsidize the educational effort both are entitled to some assurance of quality from the teacher who manages the educational exercise.

These reasons, amongst others, have led students to become increasingly dissatisfied and disillusioned and the time is ripe to study what is happening in our college classrooms, and to find out why we have been landed with such a large scale student unrest. The ultimate solution lies not in trying to cure the symptom but rather in identifying the root causes and taking prophylactic action for the future.

Salaries of teachers in colleges, though far better than those of school-teachers, compare very poorly with those of equally qualified personnel in other professions, particularly the industries. Thus, teaching is the last choice for many a qualified post-graduate and several of those who are in teaching, would leave as soon as they could get a better paid job. This frustration, however, is no excuse for providing low quality learning experiences to students.

Once made 'permanent', teachers see no threat to their job security and feel no desire to either improve upon their professional skills as teachers or to raise themselves above the very mediocre. Teachers are very voluble and loud if any attempt is made to evaluate their teaching by the establishment. The attitude of most teachers towards their students is more of tolerance than anything else. Students are hardly credited with enough intelligence to even make out whether the teacher talks sense or nonsense. Evaluation by students is not encouraged or even permitted by a majority of teachers. Many have no desire to receive feed back from students. They refuse to believe that they could learn anything about themselves from their students.

The end result is that though the student pays for his education in college, once the fees are paid, he, in fact, has very little say in the content or quality of what he receives.

Guidance, academic or personal, is not an organised effort in most colleges. Students who come from the protected and highly structured environment of the school, find themselves in a dilemma for they are expected to make all sorts of decision about their academic career, and except for the lectures are mainly left to their own devices.

Systematic evaluation of teaching is done in only one college in Bombay. Interviews with other principals of colleges revealed that their only evaluation of teachers was done through heads of department, who in turn, learnt about teachers in their departments through chance comments of students who happened to meet them. Another said that he would occasionally take rounds of his college and from the amount of noise coming out of the classrooms he would make out the teachers who were not 'good enough' (implying that good teachers are those who can keep their classes quiet !)

The present study aimed at trying to establish whether student evaluation, in the present context, could be reliable. Although student evaluations are not an absolute means of knowing the effectiveness of teachers, they would at least serve to indicate which teachers were able to 'get through' to their students. If a list of criteria were provided to the student, he would very well be able to rate the teacher on a four-point scale on these criteria.

METHODOLOGY

Two instruments were developed.

1. A questionnaire for the faculty containing open- and close-ended items as well as a question in which they placed items about teacher-attitudes, characteristics and teacher-student interaction in an order of priority.

2. A questionnaire for students of all three years of the undergraduate Physics departments. Contained within this questionnaire were two rating scales - one for the curriculum (RSC) and another for the instruction received from individual teachers (RSI).

The Faculty questionnaire was administered to as many of the faculty as were available or willing to cooperate (60 out of 85).

The student questionnaire was distributed to 978 students a random sample from each of the three years, from ten colleges (Physics department) which were selected at random for the study.

The analysis is primarily exploratory and largely descriptive. One of the hypotheses of the main study was that teacher-student interaction in colleges is at a low key so that students do not perceive teachers in the same way as teachers perceive themselves. Towards this end, teachers were asked to say to which of four categories of teaching-styles (1) they considered themselves to belong. Correspondingly students were asked to state which of the fourteaching styles each teacher mainly followed.

FINDINGS AND DISCUSSION

Table I shows the self rating of each teacher and the mode of the ratings given to him/her by the students. Where an equal number of students voted a particular teacher as belonging to more than one category this is indicated as e.g. A+B.

TABLE I

Teacher	Own Rating	Students Rating.	Teacher	Own Rating	Students Rating	Teacher	Own Rating	Students Rating
1	B	D	17	B	B	31	B	B
2	B	D	18	A	B	32	B	B
3	(A+B+C+D)	A	19	B	B	33	B	B
4	(A+C+D)	B	20	B	A	34	B	B
5	C	B	21	D	B	35	D	A+B
6	C	B	22	B	A	36	B+D	A
7	A	B	23	B	A	38	B	C
10	B	B	24	D	B	39	B	B
11	B	B	25	B	B	41	B	A
12	C	C	26	C	B	42	C	B
13	B	B	27	C+D	B	43	C	B
14	D	D	28	C	C	44	D	A+B
15	C	B	29	B	B			
16	D	B	30	B	B			

Table I : Teachers perception of their own teaching styles compared to that as perceived by their students.

*A: Control oriented; B: Content oriented

C: Discovery oriented; D: Sympathy oriented.

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*A:	Control oriented :	Where the teacher is most concerned with maintaining discipline, seeing that students work hard and teaching them to follow instruction.
B:	Content oriented :	When the teacher feels it is most important that students know their subject matter well and he covers the material thoroughly and tests their progress regularly.
C:	Discovery oriented :	The teacher stresses making the class interesting and encourages students to be creative and to figure things out for themselves.
D:	Sympathy oriented :	The teacher thinks it is most important that he be friendly and well liked by student and is able to understand and handle their problems.

Table II shows that the maximum number (67.5%) of teachers were perceived by their students as being content-oriented. Of the teachers, only 55% saw themselves as possessing a content-oriented style of teaching.

TABLE II

Teaching style		Percentage of teachers
Control oriented	..	17.5%
Content oriented	..	67.5%
Discovery oriented	..	7.5%
Sympathy oriented	..	7.5%

Table II : Students' perception of their teachers' teaching styles.

These were not necessarily those who were perceived bystudents as possessing the content-oriented style (Table III).

TABLE III

Student-Teacher agreement.	No.of cases
A - A	1 (2.5%)
B - B	16 (40%)
C - C	2 (5%)
D - D	1 (2.5%)

Table III : Agreement between students and teachers regarding the latter's teaching-style.

A contingency coefficient, calculated for student- and teacher-perception of the latter's teaching style gave a value of

0.36 and chi square value of 2.75 which were not at all significant and confirm that the two are independent; that students and teachers do not perceive the latter's teaching styles in the same way. This supports our earlier stated hypothesis that teacher-student interactions are rather low.

The faculty questionnaire also asked the teachers to make a priorities list of a number of items referring to the attitudes and emphases that, in their opinion, a teacher in their situation must have (2,4). Listed below are these eighteen items in the priority assigned to each item by the majority of teachers(Table IV). In a few cases all eighteen items were not rated. Hence the mental scaling method (3) has been used to combine the ratings.

TABLE IV

C	Teacher's knowledge of subject-matter.
O	Teacher's self-confidence
P	Thorough preparation by the teacher.
I	Sincerity to the teaching profession
R	Teacher's communication skills
F	Teacher's enthusiastic attitude
A	Firmness in dealing with indiscipline
N	Emphasis on understanding by students
D	Cooperative attitude towards students
G	Teacher's dynamic personality
M	Encouragement of student initiative for independent study
Q	Availability of teacher for personal consultation
B	Friendliness with students
H	Teacher's good humour
L	Justice and fairness
E	Teacher's politeness
J	Task-oriented and business like behaviour
K	Criticism of student work.

Table IV : Priorities to different aspects of Teachers attitudes as assigned by the Teachers themselves.

A study of the nature of the priorities in Table IV reveals that the teacher's primary concern is with himself. Those items which relate to his own performance (C,O,P,T,R,F,A) merit a higher rating. On the other hand items which call for interaction with student (N,D,M,J,B,H,L,E,K) merit a lower rating. Two exceptions to this generalization are G(Teacher's dynamic personality) which merits a 10th position and J (Task-oriented and business-like behaviour) at the 17th position.

Emphasis on students' understanding (N) merits an eighth position and Encouragement to student initiative for independent work(M) comes eleventh. One would rationally expect both these (N and M) to be important components of the teachers' approach, specially in the case of teachers of a subject such as Physics.

The general trend indicates that the majority of teachers are authoritarian and subject centered. Their main concern seems to be with preparation and delivery of knowledge to the student to "take it or leave it". To stretch the point further, it appears that they do not see the relationship between teaching and learning. It were as if the teacher comes to do 'teaching' and the student comes to do 'learning' and not as if the teacher comes to teach the student to learn. They do not see themselves and their students participating together in the "fluid process of learning".

The researchers feel that there is a great need for introducing pedagogy to the teachers. Faculty development in its present form (through COSIP and ULP programmes,* and the recently introduced M.Phil programme) aims at providing advanced level subject-matter and at developing the research potential of the teacher in the college. At no place is it even suggested that the college teacher may infact need to learn how to teach.

It is interesting to note that even in the University Act, no definite aims and objectives that a college must fulfil are laid down. Presumably, their main objective is to provide instruction

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*COSIP : College Science Improvement Programme.
ULP : University Leadership programme.

to equip students to appear for university examinations. Nor does the University specify in what manner instructions should be organised to be efficient and effective. Instruction is expected to be provided through lectures and where necessary, tutorials or practicals. It does, however, define the syllabii and prescribe text-books that teachers must use in order to equip their students for examination(5). This is yet another instance of the distance that the university maintains from its clientele - the students.

The aims of higher education proceed no further than the cognitive domain and even within this domain, teachers, through their approach, have limited themselves mainly to the provision of knowledge and a superficial training in laboratory skills. Achievement of the other aims and objectives are left largely to chance.

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STUDENT EFFORT AS A FUNCTION OF CURRICULUM STRUCTURE, SCHEDULE AND EVALUATION MODE

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As one moves up the educational ladder from elementary to secondary to higher education, more and more reliance is placed on self study by students to achieve expected levels of academic achievement. Indeed, complex motivational models of achievement have been proposed to predict and explain differing levels of achievement, but, strangely enough, there is a dearth of empirical data on the actual effort voluntarily put forth by students in self study outside of formal class contacts. As a result, university faculty fall back on rules of thumb about expected student effort in devising teaching and student evaluation formats and schedules. When demands arise from revision of curriculum by the Ministry of Education to meet budgetary constraints, faculties are at a loss as to how to proceed rationally or to defend student output against its critics at higher levels of bureaucratic control.

Furthermore, the relationship between faculty activity in teaching and examining and student effort remains obscure and thus is controlled by chance rather than by design. This discrepancy can and often does result in false and contradictory expectations between faculty and students, with resultant low levels of achievement and high personal and societal costs.

In response to such demands for curriculum reform at the University of Leyden's School of Law and in the Departments of Chemistry, German and Psychology, extensive self report data were gathered over a two year period, detailing the daily time spent in formal classrooms and the time spent in self-study, on a sample of the respective student bodies in the early years of the programs.

The present report will concentrate on the data obtained over a two year period at the School of Law, although some comparisons will be made with the other samples where specific hypotheses can be elucidated.

The sample resulted from the random solicitation of the college registrar's lists. Student were sent a letter signed by the college Dean or Department Head, and the Director of the Educational Research Center explaining the nature and purpose of the study, promising them anonymity and offering them compensation of 100 guilders (approximately $ 40.00) for completion of time budget forms for an academic year.

(Insert Table I about here.)

Table I describes the sample who completed the study in each department in response to the request for cooperation. In the case of law and chemistry, the comparisons of the sample and the population showed that there was a bias toward a larger number of successful students which makes the following effort data even more interesting.

Students who agreed to participate were sent a form each week of the two terms of the academic year. The forms were sent by mail and students were instructed to return them by mail or by placing them in a special box in their department building.

The forms were designed to maximize the ease of reporting and the accuracy of the report of actual hours spent each day by the respondent in study outside of assigned classes (self study) and at class attendance (class hours). Thus, each weekly form contained a number of squares, divided into days by courses matrix. Specifically prepared forms were provided to reflect the actual class schedule of the students for each week in order to minimize any confusion about expected class attendance or the particular individual schedule. Since the students in the regular curriculum pursue a highly structured common curriculum in the early years of their programs, it was easy to devise such forms for the total sample.

Generally, the forms were returned on schedule and correctly filled out. If not, the students received a warning letter within one week urging their cooperation. If they failed to do so, they were dropped from the study and forfeited the agreed monetary reward.

Detailed analyses were conducted of the students' performance by amount of self study, class attendance, type of secondary school preparation, etc. Except for type of school preparation, which indicates early selection in the educational history of the students based on overall performance in science vs. non-science curricula and consequent attendance at more or less demanding curricula in the secondary school system, there was little relationship between performance and any of the above variables. This may seem surprising, but as one examines the self-reported profiles of academic effort, as summarized for two semesters of the law curriculum in Table 2, several determining factors emerge.

(Insert Table II about here.)

Table II gives the faculty expected study load used to devise the curriculum versus the reported class attendance and self study by the students for each course in absolute hours and in percentages. It is clear that there are wide discrepancies between faculty expectation and student compliance. In the first semester of the first year the combined class attendance and self study hours range from 83% of expectation to

43% and average about 60% of expectation. In semester II effort drops to an average of 53% of expectation.

Clearly, the students are perceiving a very different message from that which the faculty intends to give. Since approximately 50% of the first year students fail the course and must repeat the year and, since class attendance and hours of self study are only minimally related to success, success seems to be a matter of the ability of half of the students to get by with minimal dependence on the actual instruction or completion of the assignments - a very inefficient arrangement at best, wasteful of talent and effort of the students and faculty.

(Insert Figure I about here.)

Sticking with the law school data further, Figure I shows the reported self study and total effort day by day in two typical weeks without a scheduled examination and during the examination period for the first and second semesters. From these data some explanations begin to emerge. The scheduled classes are concentrated in the first three days of the week in semester one. The student effort closely follows this pattern and is concentrated in a three to four day week starting on Sunday and falling off rapidly by Thursday to practically nothing until the following Sunday. A possible interpretation is that the faculty gives out a very unclear message about the consistency of effort required to succeed in the program. Their own behavior, i.e. the concentration of scheduled classes in a three day period, means, from student report, that a three day effort totaling about 25 hours per week is all that is required to succeed. Thus, the student effort closely follows the tangible structure as provided by the faculty. The second semester effort curve reflects the spreading out of the class schedule over a four day week with consequent leveling of effort.

(Insert Figure II about here.)

Further confirmation of this finding is given by Figure II which sums effort over the second term of first year law school where the expected peak of effort in each course takes place at the expense of the remaining courses as the final examinations are scheduled. Since these are bunched in the final two weeks of the term, the situation for the majority of the students becomes very tight and effort is a total average of 30 hours per week. Given the rate of failure, one must conclude that a more even distribution of effort might be more efficient and productive.

To test this assumption, and in the true spirit of "action research", the faculty was induced to spread the final examinations over a broader span at the end of the term. The ensuing data of student self report did show an immediate leveling of increased effort over the whole elongated exam period and, most importantly, success levels were raised.

However, inspection of the reports of students in chemistry and German support the contention implied above that the actual schedule of class time determines effort. In chemistry, classes are spread out a bit more than in law and so is the student effort, albeit still at an alarmingly low level with a consequent high rate of failure. Learning elementary chemistry is very dependent on explanations and problem solving in the actual classroom presentation until a firm foundation is laid down which permits the student to proceed more on his own, with thought experiments, journal reading and laboratory work. In law, there is more opportunity for self-instruction through books and cases from the start.

Confirming the general assumption that the nature of classroom activity as well as its scheduling influence effort, are the German department data. Here we find a much more even daily effort of self study. The reason seems to lie in the nature of language instruction at the introductory level. Students are expected to participate actively in each class meeting and are often called upon to recite. This, plus the fact that enrollments in German are a small fraction of those in law, chemistry or psychology, results in the need to be prepared to some degree for each class since evaluation is almost continuous.

In conclusion, the following can be said:

1) Faculty behavior, as reflected in class scheduling, is more determinate of student effort than either the faculty expectation or the feedback of success and failure rates.
2) Evaluation mode and its scheduling is very determinant of student effort.
3) Assumptions about the ability or willingness of students in this educational system to self-pace themselves to maximize academic success independent of tangible faculty demand are questionable.

Given these data, one can still be optimistic about improvements in student effort and consequent success since they support the conclusion that relatively minor changes in class and evaluation schedule results in immediate and appropriate student response.

Table I

Sample N's by department and term

	Term I	Term II
Law Yr. 1	194	148
Law Yr. 2	122	--
Chem.	78	73
German	23	23
Psychology	150	150

Table II

EXPECTED AND REPORTED STUDY LOAD

	course	Expected study load (hours) total study load	face-to face hrs	self study	reported hours spent total study load	face-to face hrs	self study	percentage realised total study load	face-to face hrs	self study
1st semester	5+2	275	66	209	228	56	172	83	85	82
	4	325	42	283	159	32	127	49	76	45
	3	75	18	57	46	9	37	61	50	65
	1	100	18	82	43	9	34	43	50	41
	total	775	144	631	476	106	370	61	74	59

	course	Expected study load (hours) total study load	face-to face hrs	self study	reported hours spent total study load	face-to face hrs	self study	percentage realised total study load	face-to face hrs	self study
2nd semester	8	250	41	209	161	26	135	64	62	65
	6	150	36	114	94	31	63	63	86	55
	7	325	24	301	151	13	138	46	54	46
	9	175	18	157	73	12	61	42	68	39
	total	900	119	781	479	82	397	53	69	51

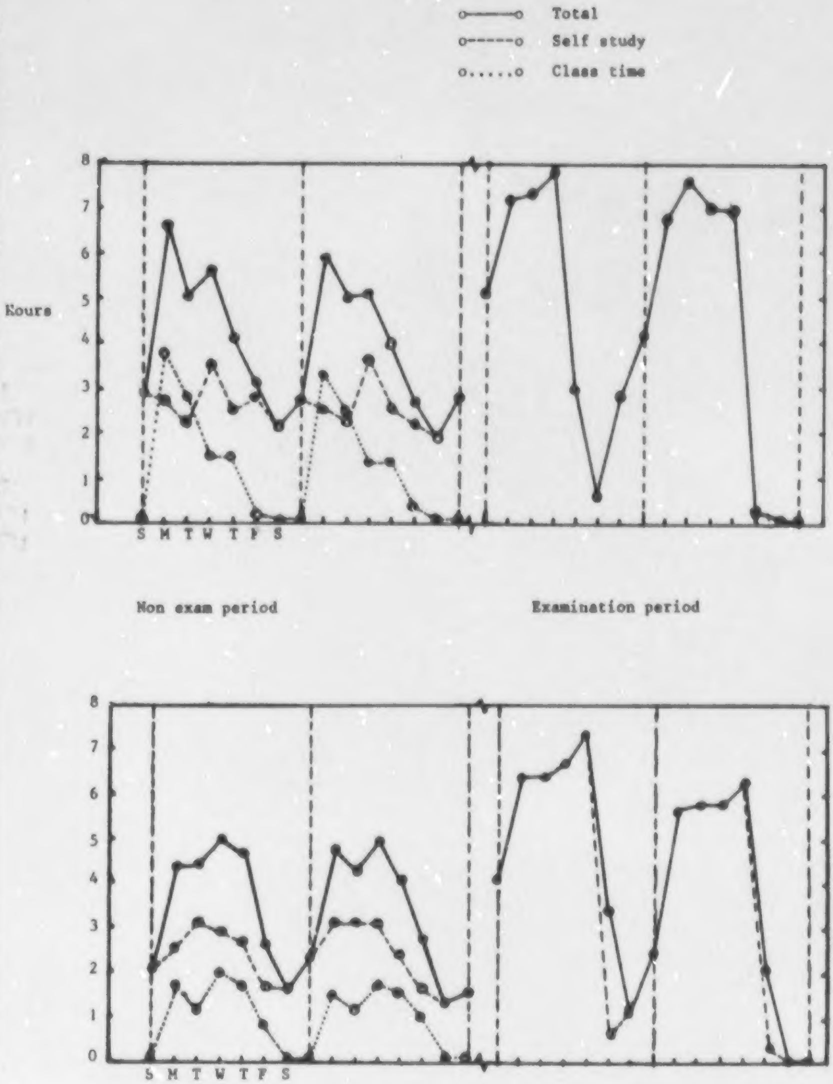

Figure I - Day by day class, self study and total effort.

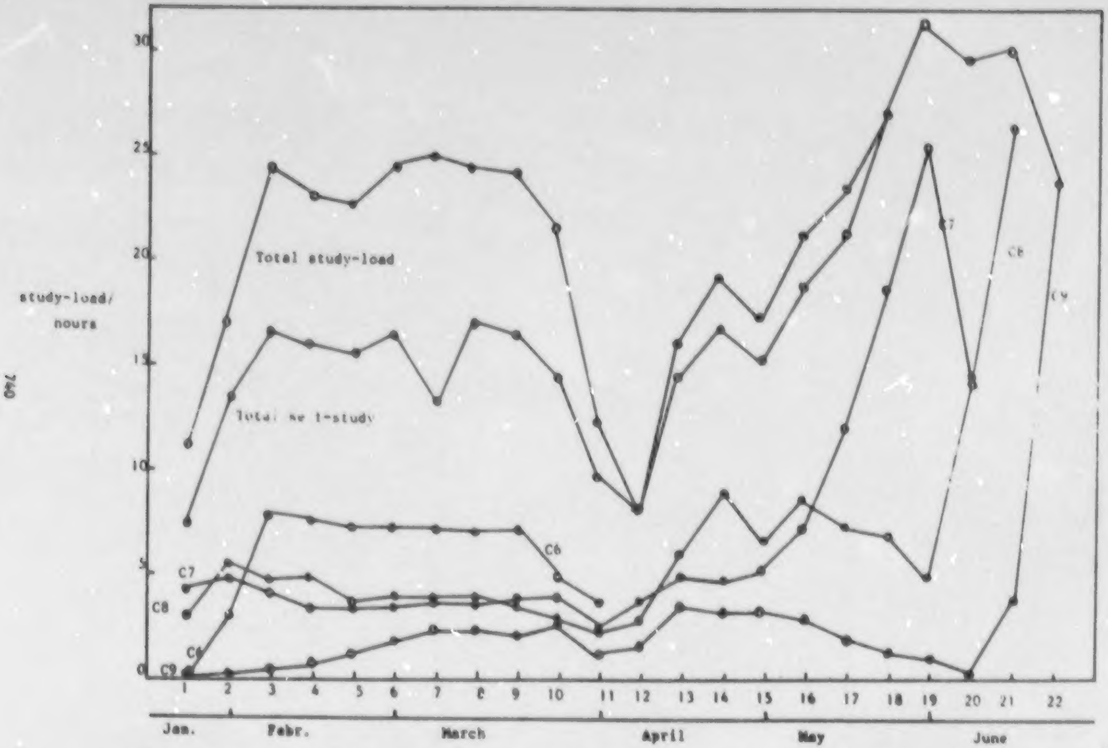

Figure II Average time spent on self-study in the second term per subject by the time reporters

THE CHEATING CRISIS IN ACADEME

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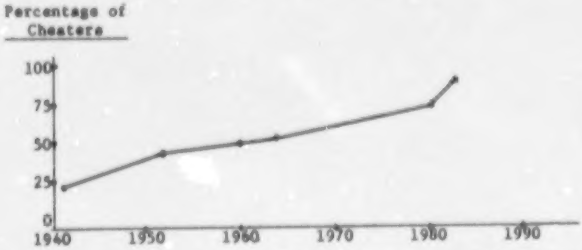
Studies have indicated that college students over the past few decades have increasingly turned to cheating to achieve success on tests and other measures of academic achievement. The purpose of this paper is to show the extent to which student academic dishonesty in Basic Studies programs[*] at Boston University (B.U.) and the University of Hartford (U. of H.), as reported by the students themselves, supports this trend.

Student-Reported Cheating: A Statistical Overview



As indicated by the above graph, student cheating has steadily increased over the past few decades. These statistics are the findings of Drake in 1941 (23%), Goldsen in 1960 (38% in 1952 and 49% in 1960), Bowers in 1964 (50%), and Baird in 1980 (75%). Our research in 1982 found that 84% cheated at B.U. and 91% cheated at U. of H. Our findings seem to corroborate the conclusion of U.S. News and World Report (October 20, 1980) and Newsweek (May 26, 1980), both of which reported that cheating on college campuses had reached "epidemic" proportions. Newsweek also concluded that most cheating goes undetected or is tacitly condoned.

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[*] The Colleges of Basic Studies, in general, admit high risk high school graduates with noted deficiencies in academic skills and poor scholastic records, but whose overall background indicates capability of college-level work.

METHOD OF RESEARCH

The authors gathered data in a classroom-administered questionnaire from 53 sophomores at the U. of N. and 59 sophomores at B.U. Students were asked to respond anonymously to both forced choice and open-ended questions. We wanted to learn how often students cheated, how they cheated, and most importantly, why they cheated.

RESULTS OF RESEARCH

Frequency of Cheating: Students seemed to have established a pattern of cheating before entering college. 85% of the U. of N. students, and 87% of the B.U. students reported they cheated in high school.

Of these students who cheated in college, most cheated on homework (62% at U. of N., 66% at B.U.), daily quizzes (42% at U. of N., 44% at B.U.), and term papers (23% at U. of N., 42% at B.U.). The disparity on term paper cheating may be due to the fact that term paper companies, such as Collegiate Research Systems, Inc., International Termpapers, Inc., and Quality Bullshit, more vigorously promote their services in the larger, more lucrative Boston area market.

How Students Cheat: Students were asked to check on a list of nine methods how they cheated. The most frequent ways of cheating were obtaining test information from other students, allowing others to use or copy work on tests, plagiarism, and not revealing marking errors made by the grader in favor of the student. Students initially tended not to perceive this last method as cheating. But in classroom discussions conducted by the authors as follow-up to the questionnaire, this unethical behavior was readily comprehended, especially when analogous situations were presented such as bank patrons receiving extra funds from a teller which they knew exceeded what was requested.

Why Students Cheat: Both at U. of H. (58%) and B.U. (35%), students reported that insufficient time to study was the main reason they cheated. This finding may indicate too heavy a work load, inadequate pre-college student preparation, inability to do college-level work, poor time management by students, or some combination of these factors. The much higher percentage of students from U. of H. who gave this answer may reflect differences in teaching approaches at the two colleges. B.U. utilizes an interdisciplinary team-taught approach, and U. of H. maintains a more traditional departmental, individualized course method.

Parental pressure was the second most important reason for cheating. 14% of U. of H. students and 32% of B.U. students gave this as a reason. The significantly higher percentage at B.U., according to Brendan Gilbane, Dean of B.U.'s College of Basic Studies, may be due to the fact B.U.'s student body is from a higher socio-economic stratum which tends to place a higher premium on success.

The most frequent free responses to the question of why students cheat were "not understanding the material," "fear of being kicked out of school," and "the opportunity to cheat."

Student Attitudes Toward Cheating: When asked whether cheating was a normal part of life, almost half of B.U. (47%), and about three-tenths at U. of H. (29%), said yes. About three-tenths of the students at both colleges also reported they felt no guilt by cheating, and about one-fifth responded they did not disapprove of cheating in college.

Students were also asked what effect an honor system would have on cheating at their college. The overwhelming response, which is very disturbing but not surprising, was "more cheating."

Finally, we asked the open response question of how cheating affected non-cheating students. Some of the important responses were as follows: cheating success encourages non-cheaters to cheat; cheating is unfair to those who work hard; cheating encourages non-cheaters to cheat just to "keep up"; teachers are misled as to how well their students are learning; cheating in an exam distracts non-cheaters, causing them to lose concentration and perform worse; and cheating makes the smarter students look less bright. All these responses clearly impact upon quality university teaching.

DISCUSSION

The study of cheating at U. of H. and B.U. tends to confirm the hypothesis of an alarming trend toward dishonesty in academe. The results of our study are consistent with the results of similar studies over the past few years.

Students who cheat in college had also tended to cheat in high school and perhaps earlier in their schooling. Although most students feel cheating is morally wrong, they cheat anyway in order to succeed, or not to flunk out. Perhaps students justify cheating by perceiving its prevalence in society. Indeed, some colleges themselves are involved in dishonesty. There are almost daily news reports of unethical conduct by colleges as pressures mount to attract money and students. Winning athletic programs often mean increased revenue from television contracts, alumni gifts, and spectator attendance at games. The "padding" of catalogs, misrepresenting course offerings, and academic opportunities, deceptively advertise to attract students from a dwindling applicant pool.

Because most students who cheat are not caught, or when apprehended, not dealt with severely, colleges inadvertently encourage cheating. From interviews with colleagues at U. of H. and B.U., we conclude that faculty members are basically lazy in respect to detecting and preventing cheating. Very few say they check out even a representative portion of sources, citations, and written material turned in by students. They contend it is too time consuming to rigorously investigate the authenticity of even random parts of assignments. Thus only the grossest, most obvious examples of cheating are detected and acted upon.

Proctoring exams is seen by many faculty as one of the pains of the profession--to be endured with the help of the New York Times, frequent coffee breaks, and small talk with fellow proctors. Students report that, even when sitting one seat apart in large lecture halls, faculty proctoring is a farce, "strictly pro forma," and that "any person who wants to cheat will find it relatively easy when there are lots of other kids taking the same objective exam. . . ."

Faculty also report they do not want to face the prospect of becoming ogres in their students' eyes by a confrontation. One colleague feared his teaching evaluations by his students might be adversely affected if he went after cheaters.

Faculty members, moreover, report they have enough to do in teaching, research, committee assignment, and university work without getting involved in cheating incidents. Our colleges have extensive formal procedures that must be followed when dealing with an unethical practice charge. The accused student has full right of due process. Forms describing in detail the specific incident are required by the administration. The student then has formal opportunity to respond to the charge and to be represented by counsel. Faculty thus often decide to "look the other way" rather than face the possibility of exhausting litigation.

Another problem is that there are several "gray" areas where cheating is understandably in question. Faculty even disagree among themselves as to whether certain practices constitute cheating. Is it wrong for students to cooperate on homework if they do not understand the assignment? When does getting some "pointers" for writing a paper become unethical conduct? Is it wrong for a student to hand in the same paper, or basically the same paper, for more than one course? When the same exam is given in multiple sections of a course, are students acting improperly when they ask others about the exam? This last example becomes more complicated because some faculty feel that giving different exams in multiple sections is unfair.

To reduce cheating, faculty and administrators should try to clarify these "gray" areas. They could also insist on prudent seating of test-takers, vigilant proctoring, and application of more severe, consistent penalties.

To allow cheating to continue on what is now an "epidemic" scale is a debasement of college education and a grave disservice to society. Academic integrity cannot be compromised; unethical academic conduct cannot be tolerated. Colleges must reverse the trend toward cheating. Perhaps, then, we all will gain from this ethical revitalization.

QUESTIONNAIRE ON CHEATING IN COLLEGE[*]

Fall 1982 Statistical Results[**]

1. How often did you cheat in high school?
a) Never 15% 13% b) Occasionally 81% 79% c) Often 4% 8%

2. How often have you cheated in college?
a) Never 9% 16% b) Occasionally 90% 83% c) Often 1% 1%

3. Have you ever cheated in college on a:
daily quiz? a) Yes 42% 44% b) No________
midterm exam? a) Yes 9% 7% b) No________
final exam? a) Yes 8% 3% b) No________
term paper? a) Yes 23% 42% b) No________
homework? a) Yes 62% 66% b) No________

4. If you have cheated in college, indicate your reason for doing so.
You may check more than one if necessary.
14% 32% a) parent pressure
2% 7% b) influence of my friends
5% 14% c) graduate school or job requirements
58% 35% d) insufficient time to study
21% 25% e) other (specify) ______________________________

5. If you have cheated in college, did you feel guilty?
a) No guilt 26% 30% b) Some guilt 55% 65% c) Much guilt 19% 5%

6. Do you disapprove of cheating in college?
a) Yes 77% 86% b) No 23% 14%

7. Is cheating a normal part of life?
a) Yes 29% 47% b) No 71% 53%

8. What percentage of students in The College of Basic Studies do you feel
cheat? a) 100% 2% 0% b) 75% 13% 9% c) 50% 92% 72%
d) 25% 40% 37% e) Less than 25% 3% 22%

9. What effect would an honor system (no proctors at exams, students trusted not to cheat and to turn in students they do see cheating) have on cheating at CBS? a) More cheating 78% 87% b) Less cheating 14% 5%
c) No significant effect 8% 8%

10. How does cheating affect non-cheating students at CBS?
Free response:

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[*] Adapted from the Questionnaire of John Baird, Bloomsburg State College Bloomsburg, PA.

[**] Percentages on the left are from the University of Hartford and on the right from Boston University.

RANKING METHODS OF SPECIFIC METHODS OF CHEATING

University of Hartford

Rank	Method	Scale Score
1.	Not revealing unmarked wrong answers or other errors made by professor	2.22
2.	Obtaining test information from other students	2.11
3.	Using or copying someone's outside class assignment	1.94
4.	Allowing another to use or copy your work or test	1.88
5.	Using or copying another's test work	1.66
6.	Plagiarism (from books or articles)	1.55
7.	Using notes or crib sheets (illegal information) during test	1.44
8.	Stealing or illegally copying a test	1.06
9.	Using bribery or blackmail to obtain a desired grade	1.00

Boston University

Rank	Method	Scale Score
1.	Not revealing unmarked wrong answers or other errors made by professor	1.77
2.	Allowing another to use or copy your work or test	1.71
3.	Obtaining test information from other students	1.67
4.	Using or copying someone's outside class assignments	1.59
5.	Plagiarism (from books or articles)	1.50
6.	Using or copying another's test work	1.29
7.	Using notes or crib sheets (illegal information) during test	1.18
8.	Stealing or illegally copying a test	1.03
9.	Using bribery or blackmail to obtain a desired grade	1.00

Scale Score

1 = never
2 = occasionally
3 = often

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PERCEPTION OF THE ROLE OF EXAMINATION IN PERSONAL DEVELOPMENT

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Introduction

Societies all over the world have been making increasing use of the **educational** certification for recruitment,placement and promotion of individuals in the modern sector jobs. This close link between certification and job market prospects have led to an escalation of educational qualifications. The examinations have assumed enormous importance, as the certificates are awarded on the basis of an examination, with the consequence, the goal of the educational system is now directed to the preparation of students to pass examinations.

Taking development as the aim of education, the institutional schooling needs to be perceived from the cognitive and social cognitive development theories. Cultural discontinuities and contextual constraints have to be taken into account for explaining performance variabilities. The increasing trend towards the social formation of bureaucratic consumer capitalism has its impact on the cognitive and affective organisation of experience and social interaction, affectng the course of development and meaning on the youth. While the institution of education is designed as a vicarious process of development under conditions of intensive social differentiation, there is widespread consensus in the literature that institutionalised education increasingly fails to fulfill this function.

In the modern society, school is considered as essential for growing up. Everybody is exposed to instruction under a formal curriculum imposed from outside. Learning is no more related to the students experience of interaction with nature and the social world. The acquisition of knowledge has become explicit through institutions with tailored schedules, fragmented curricula, formal age grading, competetive evaluation and abstract and distant goals. Meaninglessness of learning activities are perceived as empty of opportunities for experience, leading to lack of motivation, boredom, disinterest, withdrawel,passivity, apathy and powerlessness. The highly bureaucratised modern society has diverted the objective of the 'learner' from growth and development to acquisition of certificates which would give him an entry into the job market, leading to 'course credit-orientation', 'grade-orientation', and 'examination-orientation'.

There is a growing concern about the non-cognitive outcomes of increased examination orientation of the students leading to lack of interest in what they are learning either for its own sake or for its future usefulness. Further, there is a strong suspicion whether this continued exposure to this highly examination dominated system of education would result in the production of people with distorted work values. Would this type of education lead to the turning out of highly 'ritualistic' workers, killing the initiative, imagination and ability to take risks which are essential for the growth and development of the country.

In Japan, where examination dominance in learning starts at the kindergarten level itself, there is considerable fear that the economic performance achieved by the present 40+ generation schooled in a relatively examination dominance free environment, will not be maintained by their intellectually and spiritually emancipated successors. In India also there is a general feeling that our teenagers are simply being pushed too hard in the pursuit of good grades at the expence of all round education and character building.

The extent to which examination dominates the learning process is increasibg in most parts of the world. Examination dominated learning is often said to constitute bad education because its effects on character, patterns of motivation, creativity and mental attitudes are negative and outweigh any positive advantage examination orientation may have in stimulatinf and so enhancing cognitive achievement. This tendency if often deplored because of its assumed effects.

It is strange that while so much has been written on various aspects of examinations themselves, there are hardly any studies reported on how the students perceive the examination (Indiresan, [illegible]). There is no empirical evidence available regarding the students perception of the examination and how this perception is related to his other orientations, values and attitudes.

This research is an attempt to look at examination orientation in the total perspective of the various dimensions of student learning orientations and how this affects his long term work values and attitudes and workplace behaviour. The major thrust of this study is to examine the wide spectrum of socio-psychological, cultural and contextual factors which contribute to this examination orientation and how stable these orientations are. With this in view, an international study has been initiated with researchers from the United Kingdom, Japan, Malaysia, Sri Lanka, Nigeria and India. The differing socio-political and cultural contexts of these nations provide a very valuable natural setting and is expected to bring out both the similarities and differences in the learning orientation of students and their long term consequences on adult work values and work place behaviour.

The Research Design

In this ongoing international project, to start with researchers carried out independent exploratory studies in their respective countries. In depth interviews and discussions were held with students, teachers and parents. Picture projection tests and sentence completion tests were carried out. Based on the insight gained during this exploratory study and discussion among the researchers, certain conceptual clarifications were arrived at and a set of hypothetical learning orientations were identified. A distinction was made between orientation towards classroom learning behaviour and examination taking behaviour. The five major dimensions of learning orientations identified are assesment orientation, achievement orientation, interest orientation, significant others orientation and personal devolopment orientation. In addition, orientations such as job-getting orientation, extrinsic interest orientation, assessment dominance orientation and future orientation were also hypothesised. Using the item pool of statements developed during the preliminary studies in the participating countries, a Likert type questionnaire with over 120 items has been jointly contructed by the researchers to get a measure of the identified orientation dimensions.

It was mentioned earlier that one of the objectives of this project is to study the stability of the various learning orientations and that the study has been designed to be a longitudinal study. It is proposed to collect data from a large sample of students, starting from the high school level where the student takes his first major examination and follow them up in their pursuit of higher education and subsequent work place behaviour. As an interim measure, a cross-sectional study has been attemted on a small sample of Indian students to examine the stability and consistency of these orientations at different levels in the educational ladder.

This paper presents some of the salient findings based on the Indian data on the students perception of the role of examination on the personal development dimension only. As the project is still in its very early stages, the findings have to be treated only as tentative and indicative of trends. Since this is a cross cultural study, this paper is being presented even at this stage, hoping that this will lead to discussions which would be very valuable in carrying out this longitudinal study.

The Sample

In India, we have a twelve year schooling pattern with a three year undergraduate programme, popularly known as the 10+2+3 system. The student takes the first major examination at the end of ten years of secondary education, followed by another examination which gives him the school leaving certificate at the end of twelve years. Then the student enters the university for a three year undergraduate program or four to five years of a professional course like medicine, law or engineering.

The data for this pilot study were collected from 200 students of the eleventh standard, this being the prefinal year of school from five different English medium schools from the city of Madras. Data were also obtained from 58 and 52 students who were in the first and third year of a four year engineering course from a higher institute of technology in Madras city. There was an interval of two years of education between these three samples of students. The age of the high school students ranged from 15 to 18 with a modal average of 16. The first year engineering students age ranged from 16 to 19 with a modal average of 18 and the third year enginnering students age ranged from 18 to 21 with a modal average of 20. All these students came from comparable middle and upper middle class families.

Results and Discussion

In the questionnaire containing over 120 statements, there were eleven statements pertaining to the role of examinations for personal development in its various aspects. The statements and the percentage of students in the three samples agreeing or disagreeing with the statement are shown in Table I.

It is observed that, though the three sets of students were studying different disciplines and taking different types of examinations, they all exibit a very similar trend in their perceptions on the role of examinations. The response to statements 1, 6 and 9 indicate that in all the three groups, a significantly large percentage of students perceive examination as facilitator of learning. Statements [illegible],5 and 7 tries to elicit certain moral and ethical values. It is noticed that the response to these statements are in the negative, with a large majority disagreeing that examinations do influence them adversely. This perhaps is expected as these statements are highly loaded with social desirability. Response to items 4 and 11 indicate that students do perceive examinations as facilitators of desirable characteristics like perseverence. At the same time, it is interesting to note from the response to statements [illegible] and [illegible], students disagreeing with examinations facilitating in developing their character and helping them to become self-disciplined individuals. It is also noticed that the percentage of students disagreeing with statement number 8, namely, 'I like doing examinations because I think it develops my character', keeps increasibg as they advance in class. Perhaps as the students get older they consider examinations to have less impact on their character. The words 'character' and 'discipline' are very sensitive issues in the current educational context where these aspects are being challenged by the students in the pretext of freedom and autonomy. With reference to the statement number 3, ' Taking examinations is an important personal experience', it is noticed that while a larger percentage of younger students agree with the statement, a slightly larger percent (56%) of the third year students disagree with the statement. As the students get more mature, perhaps they do not give much value to examinations. A deeper investigation of these issues will be very valuable in understanding the moral and ethical values of students.

Conclusions

This study has revealed that students do perceive examination as facilitators of learning and inculcate certain desirable values like perseverence. The perceptions seem to be consistent across the three samples indicating that there is some stability in the perceptions whether the students are in school or in higher educational institution. Regarding the role of examination in building character and facilitating self-discipline the students seem to disagree.

Examination orientation is a complex issue. It needs to be understood in the context of host of other variables like the students ability, achievement, personality, socio-psychological, cultural and contextual variables to which he is exposed. This study is only a beginning in this challenging area.

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Table 1 Percentage of students agreeing and disagreeing with the statements referring to the role of examinations in personal development.

Statements	Percentage of students S-1 A	S-1 D	S-2 A	S-2 D	S-3 A	S-3 D
1. I like examinations because they help me in my learning	70	30	59	41	60	40
2. I find that I become aggressive towards my friends during examination	27	73	9	91	12	88
3. Taking examinations is an important personal experience	74	26	74	26	44	56
4. When I am not successful in examinations I want to do them again	79	21	67	33	63	37
5. Examinations encourage me to cheat	12	88	17	83	13	87
6. I consider examinations to be a necessary part of learning	66	34	64	36	69	31
7. In my class wanting to do well in examinations prevents us from sharing with each other what we have learned	25	75	28	72	17	83
8. I like examinations because I think it develops my character	42	58	33	67	25	75
9. I like examinations because they help me organise my thoughts	71	29	67	33	60	40
10. Examinations teach us to become self-disciplined individuals	43	57	43	57	42	58
11. Preparing for examinations develops in me the ability to persevere	75	25	76	24	81	19

Note: A - Agree D - Disagree
S-1 - Sample 1 - 11th standard students from high school
n= 200
S-2 - Sample 2 - I year engineering students
n= 58
S-3 - Sample 3 - III year engineering students
n= 52

CLASSIFYING THE AIMS OF CORRESPONDENCE TUTORS

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Introduction

Hardly anyone would deny that correspondence tutors do have educational aims as well as more indefinable ones but plenty of people might deny that educational aims can be classified. Or they might deny that classifying educational aims serves any purpose. Or they might feel that the search for classifications or, to use a more recently scientific word, taxonomies, reflects a subtly inhumane approach to human problems. Perhaps they are right!

Or perhaps they are wrong. The rest of this paper is an attempt to debate the issue (no vote will be taken).

Correspondence tutors in the Open University interact with students principally by means of the "tutor marked assignment (TMA)". In non-science subjects this is generally an essay-topic, standard for all students taking a particular course, but often with built-in options. The student is given a great deal of written guidance on how to approach the topic. The tutor will have been given a great deal of written guidance on how to use the student's essay as a channel for teaching and constructive evaluation. Logistical problems associated with the regional tutorial structure create a rather attenuated form of personal contact between tutor and student. Written comments on the TMA need somehow to compensate for this: to be fuller and more tactful than for the conventional University essay, for example. Correspondence teaching is a central aspect of the Open University, and almost all students value the TMA as a means of learning.

The aims of correspondence tuition are interwoven with fundamental issues concerning the purposes of education which in turn are linked to the whole philosophy of education and thereby the whole of philosophy. In a brief paper it is hardly possible to do justice to such considerations and the principal focus must therefore be on ascertaining what the aims of OU correspondence tutors actually are and considering how such knowledge can assist the improvement of correspondence tuition. Nevertheless it is clear when one considers the observations made about correspondence tuition by those familiar with it that these do often reflect some underlying personal philosophy.

It seems obvious that the provision of channels of communication whereby tutors can exchange ideas and experiences relevant to their aims as teachers will improve the practice of correspondence tuition. The Open University requires tutors to summarize their reactions to a particular essay on a standard form which yields particularly valuable data on educational aims, but this data does seem to present an atypical quantitative profile as compared with data garnered from comments written on the essay itself. On the standard (CT3 or PT3) form the tutor gives a grade for the assignment as well as a verbal summary of his reactions and there seems to be a negative correlation between the fairness of his grade and the teaching value of his verbal summary. This is an obviously undesirable feature. Using the preliminary taxonomy given in Table 1 a factor analysis of evaluation judgements by monitoring staff on tutor's educational aims revealed four main factors (1) Value of the aims (2) Degree of personal encouragement offered (3) Clarity of specific guidance given (4) Translucency of the aims. The status of highly ritualized comments such as ticks with regard to educations aims is highly problematic. The relationship of attempts to improve Presentation of the student's ideas to attempts to improve their Depth and Breadth seems worthy of much more attention.

In order to create a reasonably comprehensive framework for research a more abstract taxonomy is now put forward: first; two fairly general dimensions of tutorial style and then eleven more specific aims (Table 2) which are thought to underly particular comments on TMAs. One of these general dimensions concerns the extent to which the tutor attempts to form an image of the person he is teaching, sees the relationship as a dialogue between adults and manifests warmth towards and understanding of his student. This sort of person-orientation does not seem to be completely orthogonal to the other dimension which ranges from the 'school teacher' who concentrates on grammar and technical correctness to the 'don' content with throwing off in passing one or two airy fresh ideas. Though this dimension of training vs stimulating might be most relevant to the

Table 1

Taxonomy of tutor comments

		on CT3		on Script	
Comments on Presentation	(a) spelling, grammar, etc.				
	(b) style of writing				
	(c) organisation of material				
	(d) other				
Correcting	(a) facts				
	(b) comprehension				
	(c) opinions				
	(d) argument				
	(e) other				
Querying	(a) facts				
	(b) comprehension				
	(c) opinions				
	(d) argument				
	(e) other				
Suggesting additions (facts, examples, etc.)					
Suggesting cuts (irrelevances, etc.)					
Explaining	(a) amplifying, giving reasons				
	(b) giving examples				
Evaluating	(a) positive				
	(b) negative				
Motivating (general encouragement)					
References	(a) to OU materials				
	(b) to other sources				
Non-teaching	(a) admin.				
	(b) polite padding				
Illegible or obscure					

Table 2

Different aims of assignment-marking

Group A

(1) general acknowledgement

(2) correction

(3) guidance ('heuristic')

(4) explanation of the grade

Group B

(1) general amendment

(2) guidance ('analytic')

(3) legitimate problem-setting

(4) integration of the assignment into the total work-load

Group C

(1) encouragement

(2) institution refraction

(3) conscientious service

Arts faculty it lies in with other significant issues like, on the one hand, the difficulty of disciplining the thinking of adults, on the other, the possibility of stimulating in the very process of demonstrating evaluative teaching skills. Perhaps it may prove possible to use these general dimensions to organize the eleven more specific aims now briefly annotated. The third category involves guiding students towards the proper use of evidence. Category six comprises comments which aim to help the student clarify his written expression (and hence thought). Adherence to such an aim pre-supposes the tutor will try to inhibit verbatim plagiarism from course units and other texts and tutors. Finally it is possible to discern three other categories of tutor aims, though perhaps they are less clearly educational aims. A category of comments which "support and encourage" is problematic because it is felt that too direct encouragement of the "keep up the good work" variety tends to be patronizing. Nevertheless it seems that consideration of the student's morale must influence the correspondence tutor. Another sort of aim will reflect the tutor's attitude to the institutional characteristics of a distance learning system. Characteristics which have been mentioned are the tendency to superficial relationships and the inherently authoritarian structure indicated, for example, by the student's inability to influence the nature of his assignments. Will the tutor make an effort to over-ride these tendencies or will he subscribe to them? The eleventh and final category embraces the question of how conscientious the tutor intends to be. How much commenting will he do? Will he feel obliged to make a certain number of comments as an end in itself? Will he attempt to conceal a possible lack of acquaintance with broadcast material or even course units? It has been suggested that in multidisciplinary courses tutors working outside their specialisms are heavily dependent on tutor notes, sometimes quoted back at the student verbatim. It can be seen clearly from Table 2 that there are parallels between the taxonomy of tutor's aims based on a qualitative analysis, and the groupings of Conceptual Systems theory. There is also a parallel between the groupings and the general dimensions of 'pedagogic level' and 'person-orientation'.

The evaluation of how the tutor-marked assignment is set

1. Any such evaluation must take some account of the curriculum underlying the assignment. Some means must be found of assessing

   (a) students' current stage of development through that curriculum

   (b) their attitudes to that development

   and (c) the quality of the curricular interaction between tutors and students

   (it may also be possible to find some means of assessing expert judgements of the quality of the knowledge embodied in the curriculum).

2. It would be desirable to feed the evaluation of the teaching through a particular assignment back to the course team while there is still time to modify unfinished assignments.

3. So it seems likely that a successful TMA from a teaching point of view will possess several attributes:

(a) it will influence students to attend tutorials

and (b) these tutorials will themselves be successful on a number of counts, e.g. (i) excitement, (ii) motivation, (iii) causal efficacy with respect to learning, (iv) causal efficacy with respect to the grouping of difficult ideas, etc.

(c) the TMA will open the door to student feedback (both structured and unstructured comments) to the course team

(d) it will influence students to watch and listen to broadcasts

(e) it will enable tutors to comment effectively on the student's essay

Obviously one approach to the problem leads to direct interview of course team members and questions about what educational objectives they expect their TMAs to achieve. Another approach is to consider what educational objectives TMAs should (in some objective ethical sense) achieve. A subjectivist in ethics might consider this a nonsense question or else worry about who else was being consulted on educational objectives; an objectivist in ethics would consider it a sensible question answerable by logical analysis.

It does not take much logical analysis to arrive at the conclusion that with students varying in previous educational attainment from no 'O' levels to postgraduates the TMAs should be interpretable with a variety of hermeneutics. If the student does not find them interpretable at a satisfactory level of challenge, provision should be made for special mediation between central academics and students, by-passing the existing semi-hierarchical structure. By this is meant "hot-line" type of feedback. Systems should be devised for detecting communication barriers of such a height that student or TMA author are "at risk", and for breaking down these barriers. Systems should be devised for structuring the social dynamics of course team meetings and indeed plain "bugging" (under license) of some meetings and subsequent broadcast as part of an IET contribution to the course might be salutary. Procedures should be devised for assigning authorship of a particular TMA to a particular member of a course team. Perhaps it is even possible to envisage co-operation between different course teams as such (rather than co-operation based on individuals who participate on more than one course team or based on

individuals in particular course teams who know individuals in other course teams) leading to a more pluralistic assignment-construction policy. Perhaps one destiny of IET will be to organize such co-operation.

Acknowledgement

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Abbreviations

CMA	Computer-marked assignment
CT3	Standard form for tutor-to-student feedback
IET	Institute of Education Technology, Open University
OU	Open University
SARG	Student Assessment Research Group, IET
TMA	Tutor-marked assignment

ADULT LEARNING STYLES AND COMPUTER TECHNOLOGY

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The computer revolution is today a fact of life for millions of people in western societies. This extraordinary development confronts educators with a host of issues, among them the question of how to guide adults as they learn computer operation.

Electronic technology is often thought to be inherently interesting and stimulating. One need only observe the nearest video game parlor to be convinced. Yet, the computer revolution will make far more serious demands on most adults whether they are engaged in continuing education or an occupation.

This paper examines the results of a study designed to assess adult learning styles and learning method preferences among a group of adults who use computers in their daily lives. Recognizing the experiences and learning repertiore of adults who operate computers will serve educators as they seek to design educational programs for the rapidly developing computer age.

Theoretical Framework

Despite an abundance of theory, research and recommendations, little specific information about adult learning styles and learning preferences has been available to guide educators in planning and conducting courses or other learning experiences for adults (Schuttenberg, Gallagher and Poppenhagen, 1982). Undergraduate and graduate degree programs designed to prepare specialists in the fields of computer and information technologies may provide little help to adults already engaged in an occupation. Manufacturers of data and word processing equipment focus training programs on two related methodologies; didactic instruction accompanied by practical application or, a form of individual learning using programmed materials (Deutsch, Shea, and Evans, 1979; McElhone, 1982). The predominant teaching-learning model, therefore, is that of one-way knowledge transmission from the expert (instructor) to the novice.

Adult learning theory discussed by Kidd (1959), Knowles (1972, 1973), Messick (1976), Apps (1981), and others has stressed the idea that adults are capable of major participation in the design, conduct, and evaluation of their own learning experiences. Research by Penland (1977), Gross (1977), and Tough (1979), has documented the finding that large numbers of adults are partially or completely self-directing in their learning efforts.

Citing studies on self-directed learning by Penland and McCatty, Cross (1981, pp. 190-193) points out that strong reasons for adults to avoid classroom learning situations are their desires to select subject matter and to determine their own learning strategies and procedures. Tough (1978) discovered that self-directed learners consider group learning, where planning is done by a teacher or leader, to be less satisfactory than other learning designs which permit more planning influence by the learner.

Today, continuing education related to ones career or occupation often implies the need to learn computer operation. With greater numbers of mature, knowledgeable adults seeking or being required to attain computer operation skills, the traditional teaching-learning models of one-way transmission from expert to novice or even programmed learning may be less appropriate than once imagined.

Objectives of the Study

The objectives of the study reported in this paper are to investigate the following questions:

1) What are the characteristics (e.g., age, sex, educational background, involvement in continuing education, previous computer training, and so forth) of adults who operate data and word processing computers as part of occupation related activities?

2) What are the preferred learning styles exhibited by adults who use data and word processing computers as part of their occupational activities?

3) What are the relationships which exist between preferred learning style and the demographic characteristics of adults who operate data and word processing computers?

Finally, the study seeks to identify implications which grow from the analysis of relevant data for the design of learning materials and learning experiences. This was a preliminary study. As such, it performed the additional functions of validating questionnaire items and creating population and distribution formats while establishing a data set for later study of instrument reliability.

Method

A questionnaire survey methodology was established to gather data relevant to the study's three objectives. The survey instrument was developed in two parts. Part

I included the Learning Style Inventory (LSI) developed by David Kolb (1976). The Kolb instrument was selected for three reasons. It can be completed in a short period of time. It can be effectively administered through mail survey and, finally, it has been extensively tested among adult populations (Kolb, 1981). Respondents were asked to rank groups of four descriptors on the basis of how closely each descriptor was representative of their learning style. LSI scoring procedure yields the respondent's preferred Learning Style Type. Possible Learning Style Types include the "Converger" whose dominant learning abilities are abstract conceptualization and active experimentation; "Diverger", whose dominant learning abilities are concrete experimentation and reflective observation; "Assimilator", whose dominant learning abilities are abstract conceptualization and reflective observation; and, "Accommodator" whose dominant learning abilities are concrete experience and active experimentation.

Part II of the questionnaire was designed to include twelve items each requesting information regarding specific demographic variables (age, sex, level of formal education, previous participation in continuing or adult education, current job title, job title at time of initial computer operator training, nature of initial computer operator training and reasons for selection, preferred method of learning and reasons for selection).

A panel of six persons including three specialists in the field of computer training and three experienced computer operators were asked to assess the instrument. Following assessment and appropriate modifications to questionnaire items, face validity was assumed. Reliability data for the instrument will not be determined until retesting has occured.

Data Sources

One thousand two hundred thirty-seven questionnaires were distributed through two mailings in December, 1982. Two hundred fifty-one packets each containing three questionnaires were mailed to CPT dealers throughout the United States. This mailing included the total population of CPT U.S. dealers who were asked, in turn, to distribute the questionnaires to corporate and government agency users. Distribution using this method was chosen to maximize responses from the U.S. operator population who were accessable only through dealer addresses. A second mailing of 500 packets, each containing two questionnaires, was directed to CPT word processing operators employed by U.S. Government contractors in Europe. A cut off date for returns was established as February 6, 1983, five weeks following initial mailing and sufficient time to allow for return of international mail.

A total of 408 questionnaires were returned. Thirty-six questionnaires were incorrectly completed, 83 were returned after the cut off date, leaving 289 questionnaires for analysis. Ages of respondents ranged from 18 to 48 and over, with a mean age of 29. There were 251 (86.9%) women and 35 (12.1%) men in the responding population. Three persons were not identified by sex. Thirty three percent of respondents had completed high school and 55.5% had attended college. Graduate education had been experienced by 9.7%. Fully 87.5% had participated in some form of continuing or adult (non-credit) education. Following coding, data analysis proceeded using descriptive statistics including frequency counts and percentiles for each of the demographic variables. LSI data were calculated following the standard LSI scoring procedure. Data from the LSI (respondent's Learning Style Type) and six demographic variables were then compared using crosstabulations.

Results

Demographic data referred to in the preceeding section suggest that the study's population is young. Eighty-two percent of respondents were below the age of 37. Women predominate within the population. The majority of respondents listed clerical job titles. Managerial job titles were identified by only 20 respondents. Interestingly, the study's population can be characterized as well educated. Fully 42.2% of respondents had completed two years of college. Another 13.5% held baccalaureate degrees while 10% had undertaken graduate education. Consistent with these findings are the data relative to participation in continuing education. Approximately half of the population had experienced continuing education (48.4% in their communities, 67.1% in their place of employment). However, only 21.1% of respondents reported having had such experience as part of military service. In part, this latter finding may be accounted for given the predominently female character of the population. However, further questions remain as 52.6% of the study's population were European based operators associated with U.S. military and diplomatic agencies.

Data identified in Table 1 provide futher information regarding the respondent's level of previous education. Over 87% of the population had experienced continuing education from at least one source with 35.6% reporting continuing learning activities from two distinct sources. In general, the task of learning computer operation was not the respondent's first post high school or collegiate formal learning activity.

Table 1

Respondent's Previous Experience with Continuing Education

Category[a]	Frequency	Percent	Cumulative Percent
One Type	123	42.6	42.6
Two Types	103	35.6	78.2
Three Types	24	8.3	86.5
Four Types	3	1.0	87.5
No Continuing Educ.	36	12.5	100.0
Total	289	100.0	

[a] Types of continuing education included: Community (schools, churches, recreation programs); Workplace (job training, self-improvement, recreation); Military (basic, advanced or specialized); Other.

Survey respondents all operated CPT computers as part of their occupation. However, fully 48.4% indicated that they had learned computer operation prior to working with CPT equipment. Subjective responses where requested to a follow-up question concerning a description of prior learning. Common responses indicated that learning had occured because a computer was available in the work environment. Few respondents indicated that any formal learning activity had preceded their initial use of a computer.

Table 2 identifies data concerning the nature of respondents initial and preferred computer learning. Fully 40.1% of the population used a combination of classroom and self-instruction when first learning CPT computer operation. Another 40.1% of the population experienced classroom training though in 14.5% of the cases this was supplemented with the use of programmed materials. A total of 18.3% of repondents taught themselves. Of this group, only 1% used programmed materials, 10% used no materials but enlisted the aid of co-workers, while 7.3% used a non-programmed manual.

These data are instructive when viewed in light of the fact that 250 (86.5%) of the population indicated having had no choice in selecting a learning method. Only 2.4% of respondents selected their method of learning from among alternatives. Another 11.1% said they had some opportunity to do so.

When asked what type(s) of learning experience they would select today were options available, fully 80.6% said they would not select a didactic experience as their only learning method. However, 66.4% said they would prefer a combination of classroom instruction and the use of programmed materials.

Table 2

Respondent's Actual and Preferred Computer Learning Method

Category	Frequency[a]		Percent		Cumulative Percent	
No Response	4	(0)	1.4	(0)	1.4	(0)
Class	74	(56)	25.6	(19.4)	27.0	(19.4)
Class with Programmed Materials	42	(192)	14.5	(66.4)	41.5	(85.8)
Self Taught with Programmed Materials	3	(14[b])	1.0	(4.8)	42.6	(90.6)
Self Taught with User Manual	21		7.3		49.8	
Self-Taught with aid of co-workers	29	(19)	10.0	(6.6)	59.9	(97.2)
Combination of Methods	116	(8)	40.1	(2.8)	100.0	(100.0)
Total	289	(289)	100.0	(100.0)		

[a] Numbers in parentheses indicate respondent's preferred computer learning method.

[b] Represents combined total for the categories self-taught with programmed materials and self-taught with user manual.

Respondents who commented on a subjective followup question concerning their choice indicated overwhelmingly that a structured class was the best way to begin but that classes ultimately slowed learning. A total of 11.4% indicated a preference for completely self-directed learning methods using a manual or the assistance of co-workers. These persons suggested that learning could be accomplished more quickly and efficiently in a completely self-directed mode. Particularly noted was the idea that classes proceed too slowly.

Table 3 presents LSI data for each of four preferred Learning Style Types. Ninety-eight respondents (33.9%) exhibited the accommodater type as a preferred learning style. Kolb (1976) recognizes these learners as having their greatest strength in, " ... carrying out plans and experiments and involving themselves in new experiences." Eighty-three persons (28.7%) were recognized as divergers. Their greatest strength lies in, " ... imaginative ability ... and in the ability to view concrete situations from many perspectives." Seventy-one convergers accounted for 24.6% of the total. These learners find their strength in the " ... practical application of ideas." A person with this style, " ... seems to do best in those situations like conventional intelligence tests where there is a single correct answer or solution to a question or problem." The smallest learning type group consisted of assimilators (37 respondents, 12.8% of the population). The assimilators greatest strength lies in the ability to " ... create theoretical models. They excel in inductive reasoning and in assimilating disporate observations into an integrated explanation" (Kolb, 1976, p. 7).

Table 3

Respondent's Preferred Learning Style Type

Learning Style Type	Frequency	Percent	Cumulative Percent
Accommodator	98	33.9	33.9
Diverger	83	28.7	62.6
Converger	71	24.6	87.2
Assimilator	37	12.8	100.0
Total	289	100.0	

Crosstabulations of six demographic variables (age, sex, formal education, continuing education, initial training experience and preferred learning method) were carried out with each of the four Learning Style Types. The distribution of Learning Style Types across the total population was consistent with the distribution for respondents by age, among the female population, for all types of continuing education experiences and for all categories of preferred computer learning.

The distribution of Learning Style Types among males varied from the distribution among females as Table 4 illustrates. Fully 20% of males were identified in the

Table 4

Preferred Learning Style Type for Male and Female Respondents

Learning Style Type	No Response	Female	Male	Total
Accommodator[a]	1 1.0 33.3 0.3	88 89.8 35.1 30.4	9 9.2 25.7 3.1	98 33.9
Diverger	2 2.4 66.7 0.7	74 89.2 29.5 25.6	7 8.4 20.0 2.4	83 28.7
Converger	0 0 0 0	59 83.1 23.5 20.4	12 16.9 34.3 4.2	71 24.6
Assimilator	0 0 0 0	30 81.1 12.0 10.4	7 18.9 20.0 2.4	37 12.8
Total	3 1.0	251 86.9	35 12.1	289 100.0

[a] Figures represent Frequency, Row Percentile, Column Percentile and Total Percent for each cell.

assimilator and diverger categories while 24.3% were identified as convergers. Only 25.7% scored in the accommodator category.

A similar finding can be reported for persons with higher levels of education. Persons claiming a four year college degree or graduate education were more represented among the converger and assimilator learning style types than were persons reporting two years of college or a high school diploma. Finally, it should be noted that respondents who identified themselves as having experienced initial computer training through self-directed means were also more represented among the converger and assimilator Learning Style Types than was the general population.

Discussion

In a recent study of learning styles in adult education (Pigg, Busch and Lacy, 1980), the researchers concluded that "Educators designing educational programs would be very well advised to consider both information on learning styles and learners' preferences for particular educational technique" (p. 242). The present study provides specific data regarding adults' preferred learning styles and learning preferences related to computer operation.

Recommendations which grow from the findings should be viewed with caution given the exploratory nature of the study. It seems reasonable, however, to suggest that educators should more closely examine the salient characteristics of the adult population who use computers in their occupation.

Objective (1) Adult students of data and word processing computer operation are likely to be young, female and in relatively low level career and occupational positions. Yet, they are highly experienced learners capable of discriminating among learning options. At the very least, educators should strive to diversify the learning methods available to adults in occupational settings.

Objective (2) Adults who operate data and word processing computers are relatively evenly distributed across the four Learning Style Types considered in this study. Even assimilators, though representing the smallest group within the population were substantial in number particularly among male respondents. The study's findings suggest, therefore, that no assumptions should be made regarding a "best method" for teaching-learning strategies unless the assumption is that increasing learning options will ultimately promote more effective learning.

Objective (3) Persons with higher levels of education and those with previous self-directed learning experience relative to computers, tend to be characterized more often by converger and assimilator learning styles. As Kolb (1976) suggests, "The assimilator, like the converger, is less interested in people and more concerned with abstract concepts, but is less concerned with the practical uses of theories". It appears, then, that even didactic instruction and programmed learning materials need to accommodate the abstract-conceptual learner. The classic distinction between training and education should be considered carefully as programs and materials are developed. In short, the desire to learn machine operation will not always connote a skills training format. Many adults approach even mechanically oriented learning tasks from a theoretical or conceptual directions.

The implication for educators of adults who aspire to knowledge and skill in computer operation is clear: Unilateral decision making by the educator-expert regarding the most effective methods of learning may not appropriately meet the expectations of significant groups of adult learners.

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SHARING GOOD PRACTICE

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Introduction

That difficult mother of invention, necessity, has driven many a local leader not to drink but to innovation. Homemade solutions to local problems sometimes are not elegant, but they fit local conditions and hold the commitment of practitioners to degrees rarely matched by the sophisticated products of distant R & D centers.

Many grant-making agencies now recognize the power of local invention and fund it as a good way to test new ideas. The Fund for The Improvement of Postsecondary Education (Hereafter called "the Fund") has experimented with various ways to support the dissemination and adaptation of practical solutions to practical problems. One such experiment was a Special Focus Program called "Adapting Improvements: Better Strategies for Educating Adults." Its call for proposals outlined that diffusion project:

> "In this Special Focus Program the Fund is seeking proposals which will improve and extend education for adults through the adaptation or diffusion of effective practices. Unlike the Comprehensive Program, which encourages proposals for improving postsecondary education without regard to category, this program solicits applications for a more specified impact. Applications must be concerned with (1) a specific area for improvement - adult learning - and (2) a particular strategy for improvement - adaptation/diffusion. We anticipate that proposals will be submitted by at least three types of applicants. One group might be labeled Inventors--those who have developed a successful new approach or practice for educating adults and who now seek to spread that approach to other settings. A different approach would be presented in applications from Adaptors--those who are confronting certain problems in providing education for adults and are

seeking to adapt or adopt practices developed elsewhere. A third perspective would be that of Mediators who are in a position to broker the transfer of successful practice between those with promising solutions to providing better educational services for adults and potential users of those solutions."

Thirteen projects were funded. Seven were in the "Inventor" category, disseminating their own programs. Mediators and Adaptors evenly split the other six. Funding ranges from $19,350 to $68,442, averages $38,437, and totals $500,327. Inasmuch as Inventor and Mediator projects involved at least three and as many as forty other institutions, this half million dollars may directly influence close to one hundred institutions, a $5,000 per institution federal investment in the adaptation of adult learning improvements.

Because the Special Focus Program constituted a diffusion experiment for the Fund, they requested our evaluation of this strategy. Our job was to help the Fund gain insight into how it - and other grant-making institutions - might approach diffusion in the future.

View from the Fund

Although the Special Focus guidelines ended up very general about diffusion, the history of their development and staff interviews do suggest certain Fund views about diffusion. These are only our impressions from very limited data, but they may be worth staff discussion:

1. Start diffusion with a good practice. The Fund's main concern was to identify good adult learning projects to share, a notion in keeping with a traditional R & D assumption that the key to diffusion is a good model to diffuse.

2. Have practitioners do the diffusing. No professional diffusion experts were involved in these projects. Instead, practitioners in the field were funded to share their own practices (Inventors), share various practices (Mediators), or use another practice (Adapters).

3. Diffuse mainly by information sharing. The activity receiving most funding and attention in these projects was sharing information about good practice or practices by handbooks, workshops, films, and site visits.

4. Use of good practices occurs by inexpensive and fairly quick adaptation. "Adapter" was the word at the Fund not "adopter", but adapters received limited funds (most received none, while the Fund limit for adapters was $10,000) and no funding for adaptation lasted more than two years.

These four assumptions, if they do reflect the Fund's initial thinking, are a curious mix of traditional and recent diffusion ideas. At base, the thinking is traditional: start with a solid solution to some general problem, spread the work by media and formal gatherings, and potential users will be able to take up the practice in short order at low cost. Yet, adapter is the word and interviewees talked of it as a more active and independent problem-solving role than the traditionally passive, dependent adopter. Also, the emphasis is on practitioner initiative rather than the traditional diffusion expert.

Such a mix of old and new thinking may work. We will get a reading on that later in this report. It may, however, end up long on dissemination and short on actual adaptation, for the funding and activity rest heavily on the front end of diffusion. That possibility will be hard to judge because our own evaluation project has the same time frame as the projects. But let's see.

Special Focus Program Impact

The bottom line in diffusion is actual use of whatever is diffused. We sent 100 questionnaires to a stratified sample of institutions said by the thirteen Special Focus Program directors to have received their materials, attended their workshops, or otherwise had been involved in their diffusion efforts. Fifty-four surveys were returned. We also interviewed 40 of these "potential adapters" by phone and visited 12 of their institutions to get fuller pictures of local action.

One survey question was, "What has happened at your institution to use this project's adult learning practices?" Of these 54 institutions, close to half (44%) report a pilot project and nearly 20% report "full implementation of an adaptation or replication." Because some of those reporting full implementation reported a pilot's having also occurred, we do not conclude that over half the responding institutions have adapted these adult learning practices. Also, our 54% return is too low to conclude that we have our fair share of institutions where nothing much happened, for such places may well be less likely to respond that those with success stories. Still, a decent minority of institutions, at least double the original number, had made use of these good practices in adult learning.

Our interviews reveal what these uses have been. The story in most projects was about the same: general interest, some successes usually in small-scale or tentative implementation, somewhat more misses than hits, and adaptation rather than adoption. In the realm of diffusion practice, the batting average on actual use of model practices is fairly high, for reasons we will examine in a minute. In accordance with recent diffusion theory and Fund thinking, almost always the Special Focus "good practice" served as a stimulus and general guide for local development rather than as a model to replicate.

What Works, and Why

This extent and kind of adaptation suggests three things for the Fund:

1. Do support such diffusion, for it does pay off.

2. Adaptation is the norm, not adoption, and so the costs of that local adjustment should be recognized within diffusion budgets.

3. If institutionalization of sizable new practices is desired (in number of changes and students served), the investment of money and time in local adaptation may need increasing.

In our survey, we asked how these potential adapters got wind of the Special Focus Program practices. Apparently, all kinds of circuits can connect, so a varied approach to dissemination makes sense. Particularly helpful seems to be the combination of a brochure or other print plus direct personal contact with someone acquainted with the practice. More standard and academically rewarded fare - articles and conference presentations - seem worth doing but are not as potent as direct contact. Interviewees also stressed the importance of hearing first hand about the innovative practices. This pattern of varied channels, with a particular value to interpersonal networking, is consistent with diffusion research. The immediate message for the Fund or other supporters of diffusion is two fold:

1. Support varied dissemination tactics.

2. Support networking tactics especially.

What was the nature of interaction with Special Focus projects once initial contact was made? Most potential adapters experienced a variety of connections, especially correspondence, phone conversations, background materials and handbooks, and workshops. Interviewees stressed that the more these interactions treated them as adult learners (e.g. experienced, concerned to solve their own problems, etc.) and put the practice in terms of their own campus situations, the better. Several project directors were cited for being exciting salespeople and sensitive facilitators of local adaptation. This is a hard combination to come by but consistent with the "mutual adaptation" challenge of drawing one's audience toward your innovation while helping it create its own adaptation. The biggest complaints were about materials and workshops which were not oriented toward the audience and about inability to reach project directors later in adaptation. The lessons for the Fund again seem fairly consistent:

1. Support disseminators who can excite interest in their program but who also can facilitate the adaptation on re-invention process.

2. Support audience-oriented descriptive and handbook materials and workshops.

3. Support continuing opportunities for personal interaction with model program leaders.

Why were the Special Focus practices selected for adaptation? One answer certainly is that all the dissemination and follow up just discussed made these practices more visible and accessible than others. Interviewees also noted with some regularity that they knew the Special Focus Program project directors: dissemination was friend to friend. Thus, the Fund should select diffusers who have many friends who might be interested in their model practices.

But what about the nature of the adult learning practices themselves? What was it that made these programs attractive?

The strongest attractions were program effectiveness, compatibility with local circumstances, and adaptability. Interviewees echoed these priorities. The Fund, therefore, might well augment its criteria for selecting practices to diffuse so that they include at least the following:

1. Educational effectiveness

2. Compatibility in purposes, structures, staffing, and activities with the target audience for dissemination.

3. Adaptability, ease in modifying the practice or using only parts of it without significantly losing its effectiveness.

The Life of Dissemination and Adaptation Leaders

We grew to admire many of the project directors and local adapters we met. They were committed to adult learning, willing to endure overwork without much recognition for their cause, and had much savvy about how to get innovations used. Their problems usually were ones of limited experience in diffusion, time, and support.

Diffusion was new to most Special Focus Program project directors. Writing practical materials for colleagues is not much like writing scholarly articles for one's discipline. Conducting workshops to help people apply your practices to their settings is not much like the usual conference panel. Consultation aimed to facilitate local development is not much like training or instruction. Project directors in this program had a leg up on these differences because they are adult educators, and adapter-centered diffusion in effective teaching of adults. An earlier workshop session for FIPSE project directors by Jack Lindquist, prior to this Project, stressed this connection, and follow up assistance by Fund staff member Steve Ehrmann developed the theme. Project directors said they appreciated that kind of continuing Fund assistance when they got it. Unfortunately, most project directors had several Fund program officers in the course of their project, most of whom were not expert in diffusion. The resulting lack of continuous helpfulness was a project director complaint.

Diffusion project directors (Inventors and Mediators) generally found that they could get the word out about their practices with the time and money in their grants. The time and support problem was more acute at the adapter level. Few were supported by Fund monies. Where the adaptation leader was an administrator who had executive backing for the local development and could command some staff assistance, there was not much of a time/money concern. But some adapters were faculty or staff members assigned this work as overload; they felt frustrated, and their efforts often came to naught.

Support also had a political dimension. Where a dean was not enthusiastic, a promising adaptation got nowhere. Where faculty were reluctant to involve themselves in special ways with adults, some adaptation leaders felt stymied. Because such resistance slows down the change process, assistance often ran out before much progress could be made.

This picture of diffusion and adaptation leaders suggests several points the Fund might consider in future diffusion efforts:

1. Seek committed diffusion leaders skilled in audience-oriented, practical writing, workshop conduct, and consultation.

2. Support their diffusion work extensively for dissemination (say, full-time) and to a lesser extent for a longer period of adaptation assistance (say, quarter time for an extra year).

3. Seek similarly committed local adapters who have a fair degree of local leverage concerning the staff and budget to do new things.

4. Make funds available to adapters who have need of such practices but do not have adequate time or initial political support to quickly implement the change.

5. Assign one or more Fund staff members to diffusion so projects can have consistent and expert assistance in the delicate business of disseminating and adapting good practices.

These recommendations deviate from the Special Focus Program strategy mainly in stretching the time of support, though in small amounts so that promising starts can become successful adaptations. Such a modest additional investment could turn into pilots some of the adaptations now bogged down in planning and could turn some of those small pilots into institutionalized practices. Without such support, the extent of adaptation we found a year into diffusion may be not the beginning but nearly the end of Special Focus Program payoff.

Conclusions and Recommendations

The Special Focus Program has stimulated considerable local use of good practices in adult learning. On that bottom line, we conclude that the Fund got its money's worth. The Program also offers insight into how diffusion might be made even more effective in the future, and that is the concern of this final section.

Recommendation 1: Support Dissemination of Good Practices

We heard so much about the catalytic role of Special Focus films, brochures, books, workshops and the like that our first admonition is that the Fund continue to support such dissemination. It is not usually supported by one's institution, and it does increase the impact of the Fund's investment in initial development. Such dissemination should use various approaches, especially audience-oriented print and workshops plus personal interaction.

Recommendation 1A: Elaborate Criteria for Selecting Disseminators

Identify practices that do demonstrate effectiveness for particular learners, that show compatibility with the kinds of institutions that would be their potential adapters, and that are adaptible in nature. Identify disseminators who are articulate, enthusiastic and knowledgeable salespersons for their practice, who can present their practices in terms of their audience's context, and who can facilitate local adaptation.

Recommendation 2: Support Diffusion Networks

The University of Chicago "Mediator" project, as well as the Fund's National Projects I-IV and Project Directors Meeting, demonstrate the value of practitioner sharing, over time, of innovative practices. Support for such networking should continue.

Recommendation 3: Support Adaptation

The real payoff in diffusion lies in local adaptation, where staff members without much time or money struggle to develop new practices, often amidst considerable resistance. Assistance by Inventors and Mediators plus quite small implementation funds can have large impact if extended long enought to permit a local foothold.

Recommendation 3A: Elaborate Criteria for Selecting Adapters.

Our interviewees indicate that adapters with administrative budget and staff, with local credibility and political skill, and with executive backing are most likely to succeed in adaptation.

Recommendation 4: Support Diffusion Staff

Because diffusion can double - or more - the impact of Fund investments, and because consistent and knowledgeable program officers are found very valuable in the field, the Fund should designate one staff position for diffusion programs and should fill it with an expert in the dissemination and adaptation process.

THE ADULT LEARNING PROCESS AND ITS INFLUENCE ON THE CURRICULAR DESIGN OF AN EVENING COLLEGE

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The adult learner, unlike his counterparts at other levels of the educational system, presents a number of unique demands upon the system. These unique demands (which encompass all services of the educational system) are borne out of the environment in which the adult operates. In essence, the complexity of the adult's environment generates a myriad of unmet needs in his social, professional, and economic life which directly influences the manner by which institutions design educational activities for the adult learner.

In order to properly address and satisfy the unmet educational demands of the adult learner, institutions must analyze and understand the methods that the adult utilizes in dealing with the complexities of his environment. It is commonly accepted that because of the problematic nature of the adult's environment, he has adopted a problem-centered orientation in approaching and resolving the complexities of his environment. If this can be considered valid, then we as adult educators may want to explore the use of a problem-centered orientation for the development and design of our educational activities.

There is some credence to using a problem-centered methodology in adult learning and teaching. A number of researchers in the field of adult education agree that the adult has a problem-centered orientation to learning (Apps, 1979; Knowles, 1979, 1980; Kidd, 1977; Whitbourne and Weinstock, 1979). That is, the adult learner is engaging in a learning activity in order to establish some congruency between his behavior, needs, and environmental pressures. As Knowles (1980) posits, adults "engage in learning largely in response to pressures they feel from their current life situation". In essence, they are attempting to resolve life problems that are generated by their environment (personal, social, professional, and economic conditions). Additionally, Cross (1982) and Tough (1971) indicate that the adult "wants to apply tomorrow what he has learned today" in order to resolve current life problems.

Hence, the following paper will attempt to illustrate the use of a problem-centered methodology in the learning and teaching of adults. The basic outline to be used in this paper is listed below.

I. An overview of the Adult Learner
    a. characteristics
    b. environmental pressures
    c. needs and interests
II. Cognitive Styles of the Adult Learner
    a. acquisition and processing of information
    b. memory system
III. Problem-centered Methodology
    a. overview of problem solving theory
    b. problem solving strategies
    c. application to adult learning/teaching
IV. Conclusion

Characteristics of the Adult Learner

As previously suggested, an appropriate methodology to use in the learning and teaching of adults is one that is problem centered. Justification for the use of this methodology is evidenced in the current research concerning the development of adults and their learning processes. This research portrays the adult learner as different from his educational counterparts in a number of ways, which include social characteristics, motivations, attitudes, and needs. The research postulates further that these differences are due partly to the social milieu in which the adult participates. Thus, a scenerio can be developed which suggests that the adult's environment and social forces generate needs and interests for the adult which are different from those needs and interests of his daytime counterpart. And if these needs can be satisfied through an educational activity, the adult will engage in this type of activity.

Knox (1981) conforms to this scenario but adds (and others concur) that participation in an educational activity by an adult is in response to a problem or an unresolved situation created by his environment (life condition). He further states (as Knowles does) that the adult learner is desirous of being able to apply tomorrow what he learns today in order to resolve problem situations in his environment. Thus, the research in adult education not only posits a difference between the characteristics, motivations, and needs of adult learners and his younger counterparts, but also carrys out this thinking to include possible differences between the two groups in the time perspective of applying their new learning. This immediacy of application of new skills or knowledge plays an important role in determining the cognitive orientation toward learning. The adult learner's orientation towards learning is problem-centered due to the need to immediately apply newly acquired skills and knowledge to the resolution of problem situations. Non-adult learners have a subject-centered orientation since their time perspective towards learning usually is one of a postponed application of new skills or knowledge.

Considering this brief review of the characteristics of the adult learner (a more elaborate explanation would constitute a paper in itself), it can be inferred that adult educators would want to consider learning and teaching methodologies which are different from methodologies used for their younger educational cohorts. And if adult educators would subscribe to instructional methodologies geared toward the adult learner, they would be wise in selecting designs that are problem centered. The remainder of this paper will attempt to describe the specifics of a problem centered methodology and its usefulness to the learning and teaching of adults.

Cognitive Styles of Adults

In trying to construct a problem centered methodology for adult education, it is vital that one understand the different cognitive styles of the adult learner. In other words, we must understand the different ways through which the adult learner can acquire and process information.

As defined, the term cognitive style refers to an individual's method of processing information. Although the terminology used to describe the different styles varies, the following list (Knox, 1981) is generally accepted as comprehensive of all styles.

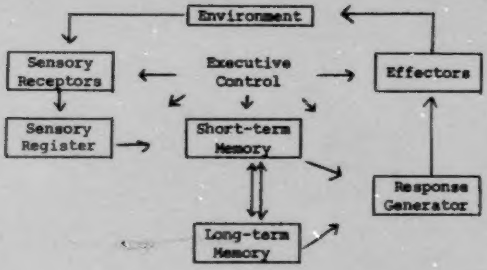
1. *Tolerance versus Intolerance for Incongruity*. The extent of acceptance of perceptions that differ from conventional experience.
2. *Reflectiveness versus Impulsiveness*. The extent to which various possibilities are considered before deciding.
3. *Constricted versus Flexible Control*. The extent of susceptibility in distraction and cognitive interference.
4. *Focusing versus Scanning*. The extend and intensity of attention deployment and span of awareness.
5. *Leveling versus Sharpening*. The extent to which memory blurs and merges similar objects or events.
6. *Complexity versus Simplicity*. The extent to which the world, especially social behavior, is constructed in a multi-dimensional and discriminating way.
7. *Conceptual Differentiation versus Description*. The extent to which categorization uses many differentiated concepts, such as thematic, functional, descriptive, and class membership.
8. *Analytic versus Global*. The extent to which items are perceived as discrete from their backgrounds and embedding context.
9. *Breadth versus Narrowness of Categorizing*. The extend of preference for an acceptable category range that is broad and inclusive rather than narrow and exclusive.

Each of the above mentioned styles affects how an individual will perceive and engage in a learning activity. For example, individuals with a more complex cognitive style tend to stress differences between items and learn better in a limited, controlled environment; whereas individuals with simple cognitive styles stress similarities between items and tend to conform to situations. So it can be inferred from the above list that an individual's cognitive style is highly representative of the manner by which an individual acquires and processes information; and, more importantly, how he will undertake a learning activity.

In addition to an individual'scognitive style, one's memory system also plays an important role in the acquisition and processing of information. The memory system of an individual consists of a system of symbolic structures which allows for the processing, accessing, and storing of information. This entire system is a serial network of associations geared toward the input and retention of information. The most important feature of the total memory system is the manner by which one codes information. The importance of the encoding aspect of the system dictates one's ability to retrieve information at a later date.

Gagne' (1970) in discussing the subject of memory and information processing describes it as an "occurence of phases of processing". By this he means that in each learning situation, there are a series of events taking place which allows for the processing of information. These events are guided by a series of internal structures of the nervous system. And each of these internal structures are responsible for a certain "phase" of the processing.

An attempt to describe the neurophysiological aspects of the phases is beyond the scope of this paper. However, the basic phases can be illustrated in the following model and explanation.



As one can see, this simple model represents a complete system for information processing. Various stimuli are generated by an individual's environment which are accepted or rejected by one's sensory receptors. These stimuli are immediately transferred to the sensory register where certain features of the stimuli are synthesized into patterns. This entire phase takes less than a few hundredths of a second. In this phase, selective aspects of the stimuli are retained for future processing. The remaining aspects of the stimuli are then eliminated from the process.

The information that remains in the sensory register is immediately transferred to the short-term memory store for further processing. There are two major aspects of this phase of the process. One, a further filtering of the random stimuli must be completed to allow further processing. The short-term memory store is capable of attending to seven (± 2) items at a time. Thus, an ordering function is developed at this phase.

Two, the transformed stimuli that remain in the short-term memory store enter an initial rehearsal activity. The rehearsing of the information aids in the encoding activities which are of extreme importance in the next phase--the long-term memory store.

The processing of information into the long-term memory store is the most important aspect of the system. The process relies heavily on the encoding of information from a perceptual into an organized conceptual framework. Piaget (1971) refers to this process as the assimilation or accommodation of information into new or established schema. The proper encoding of information affords an individual the ability to retrieve information as it is needed. The information can be accessed from the long-term memory store and applied to the specific learning situation. It is at this point that the accessed information activates the response generator.

The activation of a response by this process determines the type of performance that is required and the pattern of the performance. The performance is then exhibited in some form of observable behavior through the response effectors which address the situation created by the stimuli.

This simplified explanation of Gagne's model illustrates the occurence of the phases of processing. There is one additional feature of the model which has an important influence on how the phases are organized. In his model, Gagne' depicts a type of control function over the entire process which influences the manner by which an individual processes the information. Gagne' calls this function the executive control process which in essense determines the individual's method of processing information. The control process influences an individual's attention to certain features of the stimuli which directs the encoding strategy and ultimately the response that is issued to the stimuli.

The executive control function is a strategy which is in some instances learned by the individual. If we refer to Knox's list of cognitive strategies and combine them with the manner by which individuals process information, we may be able to develop some interesting aspects of the learning process of the adult. In essence, the cognitive style of the adult learner influences his ability to process information. The understanding of these two aspects (cognitive style and memory) is important in the teaching and learning processes of the adult since they constitute the manner by which skills and knowledge can be acquired, built upon, and retained for future reference.

Problem-Centered Methodology

As was mentioned in the outline, the third part of this paper will deal with problem-centered approaches in adult learning. If one accepts the theory that a significant portion of learning for adults is problem oriented, then a familiarity with problem solving theory and strategies is apposite to the learning and teaching of adults.

To begin with, we should take note that there are various types of learning. Referring again to Gagne', he has classified the different types of learning into a hierarchy of eight stages.

1. Signal. The person learns to make a generalized response to a signal, as in classical conditioning.
2. Stimulus-Response. The person acquires an instrumental response to a discriminated stimulus.
3. Chaining. The person acquires a chain of two or more stimulus-response connections.
4. Verbal Association. The person learns and assembles verbal chains that are assembled from a previously learned repertoire of language.
5. Multiple Discrimination. The person learns to make differentiated responses to varied stimuli.
6. Concept. The person learns to identify and make a common response to an entire class of events or objects that serve as stimuli.
7. Principle. The person learns and is able to apply a principle that consists of a chain or two of more concepts.
8. Problem Solving. The person internally thinks through the combination of two or more previously acquired principles to produce a new capability that depends on a higher order principle.

Each of these types of learning is prerequisite to the succeeding stage in terms of the total learning process. It is evident that (at least) Gagne' thinks problem solving is the highest stage in the learning hierarchy. Thus, one can now emphasize the importance for adult educators to understand an individual's cognitive style and memory system. For progression through the eight stages of learning hinges on one's ability to acquire, process, and associate information and knowledge. And, one's cognitive style and sophistication of the memory system establishes the degree to which an adult can make this progression. Thus, if we think that an adult is problem oriented in his learning, we as designers of educational activities for adults should be incorporating techniques and strategies that will enhance the adult's ability to advance to the problem solving stage of learning. The most effective manner in accomplishing this task is to incorporate problem solving theory into our educational design.

Problem Solving Theory

Present research does not provide us with a comprehensive theory of problem solving; only a number of models and hypotheses about different aspects of the process (Johnson-Laird, et. al., 1980). Part of the difficulty in isolating a single problem solving theory is that problems come in all shapes and sizes, from riddles to scientific inquiry. Therefore, no one theory can apply or be utilized on an overall basis. Regardless of this rather ambiguous state, one can unify the various aspects of problem solving into specific activities as a simple means of organization in trying to resolve a problem. These problem solving activities are:

1. initial representation of the problem
2. search strategies
3. incubation
4. terminating the problem.

Posner (1973) indicates that the most crucial time for solving a problem is in the first few moments after it has been presented. That is to say, our initial representation of the problem may structure the situation so that new observations and breaking "mind set" become extremely difficult. This initial representation is influenced by visual, verbal, and non-verbal codes. In essence, our semantic interpretation of the problem may suggest different approaches to solve the problem. Additionally, our "functional fixity" is the idea that an item has only one established meaning or use. If we cannot break set and interpret other meanings or uses of an item, the problem may never be solved.

The second activity in problem solving is in developing search strategies which direct the subject from the initial representation to the final outcome. These search strategies involve the assembling of a plan to systematically use retrieval cues (encoding aspect of memory). The most frequently used search strategy is the TOTE plan (Test-Operate-Test-Exit). This plan simply organizes mental operations into a sequential approach to resolve the problem (Simon, 1981).

Other search strategies include lateral thinking (multi-view approach) working backwards from a selected outcome, brainstorming, and creating analagous problems. Regardless of the type of search strategy, the basic purpose of these strategies is to provide a framework by which an individual can organize his thinking in order to advance toward the solution.

The best known of all of the problem solving activities is what is called incubation. However, incubation normally is not considered as a problem solving activity and sometimes label it as the "Eureka" effect. The activity of incubation refers to an increase in the likelihood of solving a problem that results from a period of inactivity with the problem. Not much is known about this phenomenon, but it is considered as an important component of the total problem solving process.

The final activity of problem solving is in how we terminate the problem. A problem is considered terminated when we have enough evidence accumulated to produce a solution that is good enough or acceptable to the solver. One way to judge the quality of a chosen solution is one's insight to the problem. If the solution is satisfactory to the individual, then the problem is solved in a satisficing manner. Simon (1981) defines satisficing as the discovery of good enough answers to questions whose best answers are unknowable. In this situation, a person accepts "good enough" alternatives to a problem not because he prefers to, but because he has no choice.

The use of these problem solving activities are commonplace but as mentioned, do not provide any structured framework to resolve a problem. However, the research in problem-solving theory does suggest a general framework to use in problem solving. This framework consists of the following steps.

1. Understanding the problem: you have to determine the goal, the data that you are given, and any general constraints or conditions.
2. Devising a plan: you have to find some method of connecting the data to the goal.
3. Execute the plan: carry out each step, checking its correctness as you go.
4. Looking back: when you have solved the problem, you should check the result and reconsider your method. You may be able to discover a simpler procedure, or a more effective one.

Application to Adult Learning/Teaching

The obvious question at this stage of the paper is what application does problem solving theory have for adult learning/teaching? The answer to this question (without being redundant) is the original proposition of this paper, which is, adult learners are engaged in learning activities in order to resolve problems generated by their life conditions. It was briefly mentioned that the adult seeks congruency between his overt behavior, needs, and his environment. Unmet needs create incongruent situations for the adult which need to be resolved. Thus the adult will seek out measures to bring about a balance to his life condition. Participation in an educational activity is one of the measures that an adult will utilize in trying to remedy any incongruency in his life condition. Hence, combining the reasons for an adult's motivation to participate in an educational activity with the assumption that his attitude is oriented to resolving incongruencies, concertive efforts should be made to design learning activities according to problem-oriented methodologies. Knowles (1980) and Kidd (1973) suggest that because of this problem-orientation, the organizing principle in adult education should be problem related rather than subject related. The difference between these two frameworks is that in a problem related design, topics would be presented in a practical context which addresses current concerns of the adult learner. In addition, the hidden curriculum for each course and/or problem would be in having the adult learner advance to higher orders of thinking and processing information. The use of problem solving strategies in relation to one's cognitive style would form the foundation for the transfer of concepts and learning to different subjects and ultimately different life situations.

Furthermore, the role of the instructor would be to direct problem solving learning for the adult learner. Since much of the activity of problem-oriented methodologies is internally guided, the task of the instructor should be one of organizing the curriculum along the line of problem solving activities. The most effective manner to do this is in designing the learning activity around novel or unfamiliar situations and then have the students use their previously learned intellectual skills and experiences to complete the learning activity. All in all, the use of problem-centered methodologies in curriculum development and instructional techniques for adult education should make the learning activity more beneficial to the adult learner.

CONCLUSION

In summarizing this paper, it was intended to present a basic arguement which might promote problem solving theory as a valid instructional methodology for adult education. The paper began by hypothesizing that adult learners are problem-oriented in their approach to education. A brief rationale supporting this problem-orientation was presented in the section describing the adult's characteristics and how the environment may influence his needs.

The paper then attempted to outline the processes (cognitive style, memory system) used by an adult in acquiring and processing information. And finally, an overview of problem solving theory and strategies was presented as a suggested framework for the design and learning and teaching activities for adults.

Obviously, the ideas outlined in this paper only constitute an overview of the tremendous possibilities of the application of problem solving theory to the learning and teaching of adults.

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THE DREAM DEFERRED: NON-TRADITIONAL STUDENTS AND THE NEW TELECOMMUNICATIONS TECHNOLOGY

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For many years now innovations in telecommunications technology have nurtured the dreams of educators around the world who have been eager to improve access to higher education for hundreds of thousands of non-traditional students. Deprived of the opportunity for educational advancement because of work or family responsibilities, class barriers or inadequate academic preparation, these non-traditional students have been a primary audience for any number of recent attempts to extend the opportunities inherent in higher education through distance-learning systems that rely heavily on electronically mediated instruction.

Great Britain's Open University, perhaps the most successful large-scale distance-learning institution with an enrollment of over 80,000 students, was first announced over twenty years ago, when Harold Wilson declared his intention to establish a "University of the Air" to provide a second chance for adults who were being excluded from careers and professions limited to graduates of traditional universities (Perry, 1977). In America, the Carnegie Commission predicted in 1972 that by the year 2000 a significant proportion of instruction in higher education would be carried on through informational technology, and three years later a study it sponsored forecast that such technology would increase the access provided by university faculty to students formerly outside the geographic limits of the regular educational system (Rockart and Morton, 1975).

The creation of The University of Mid-America in 1974 led many to believe that the British Open University could be replicated in the United States, while the announcement of PTV-3, the Adult Learning Programming Department of the Public Broadcasting Service in 1980, with the declared purpose of serving "the special needs of the new constituency of adult learners," convinced others that the new day had dawned. We became confident that the new technologies in telecommunications would equip us to meet the demographic challenges of the '80's, and that telecourses would enable us to serve the needs of a student body which was going to be remarkably different from what we had known before: different in age; in educational purpose, background and preparation; in socioeconomic status and in ethnic heritage. The glamor of the new technology was extraordinarily seductive, and many of us suspended our natural disbelief and embraced the dream with a good deal of optimism.

Sad to report, several events over the last twelve months have brought us back to reality and caused us to review the research we should have looked at more carefully before. The collapse of The University of Mid-America, the closure of the British Open University Foundation Office in New York, and the end of the longstanding relationship between CBS-TV and New York University have tempered our optimism and shaken our confidence in the capabilities of the new technology. In Great Britain last year 43% of the students offered admission to Open University courses declined because of their high cost, and in America the battle continues to be fought with conservative academics at four-year institutions who refuse to accept credit earned through

PTV-3 courses.

Slowly we are beginning to learn that the new telecommunications technology cannot solve all our problems on its own, and that it cannot be put in place without careful planning and consultation, research and evaluation. Despite the millions of dollars that have been spent on the production and promotion of courses delivered through telecommunications technology, our knowledge of what works best with specific kinds of students remains hopelessly inadequate. The rapid development of new technologies has created a new class of educational entrepreneurs, but it has yet to produce a better understanding of the special learning needs of telecourse students.

A recent review of sixty years of research on media in instruction reveals more than anything else how poor our research has been (Wilkinson, 1980). So many of our previous research efforts have been hampered by the imprecise definitions of terms, by the ambiguous wording of research questions, by faulty experimental design. We still know remarkably little about the effectiveness of our instructional strategies with different types of audiences; about the effect of different video treatments (animation vs. dramatization, documentary vs. lecture) on retention and transfer; about what captures and holds the imagination of adult learners. Even the most basic information about the number of students who completed telecourses last year with passing grades is either unavailable or untrustworthy, subject as it is to the errors of well-intentioned but poorly trained staff who know nothing about research design or the whims of campus administrators who fear the penalties of full disclosure.

The best information we have suggests that we have been dreaming all along. A study conducted for the Corporation for Public Broadcasting called Telecourses: Reflections of '80 concluded that instead of appealing to a new kind of student who would not otherwise have access to higher education, most telecourses offered through junior and community colleges attracted mainly students who were already enrolled in classes on campus (Munshi, 1980). The report claimed that the characteristics of these telecourse students did not differ significantly from those of the part-time, evening or general college population, and the extent of participation among black and Chicano students, where such data existed, was woefully small. With the exception of The University of Mid-America, extensive data on the demographic characteristics of telecourse students was simply not available from any of the four-year institutions surveyed, though in general, impressionistic responses suggested a slightly older, slightly more heavily female, slightly higher income bracket student (Munshi, p. 12).

In the face of such evidence, some of the more perceptive researchers in the field have begun to ask whether our early hopes in this regard were misdirected, suggesting that telecourses by their very nature are perhaps not suited for the non-traditional student. As Leslie Purdy of Coastline Community College has put it, "If new students are defined as adults with low access to higher education due to their being housebound or fully employed, then telecourses provide a service. But if 'new students' are defined as high risk students, then telecourses are the wrong route. Our experience, for instance, demonstrates that telecourses are difficult for people without college experience or who have trouble reading" (Munshi, 1980, p. 15).

Penelope Richardson, in a fascinating review of current research on the adult learner and television-centered instruction, suggests that non-traditional students might not be capable of profiting from electronically mediated instruction because their learning styles are not adequately addressed by telecourse design. "Adults with high general ability, well-developed cognitive strategies, prior learning in the subject area, constructive (as opposed to defensive) motivation, and a strong sense of self-efficacy are likely to do well in instructional situations that put much of the information-processing load on them; adults who lack these characteristics are likely to need their instruction to be more directive, structured, broken into small steps with immediate feedback at each step and so on" (1981, p. 13). Non-traditional students, handicapped by restricted language codes, a low sense of self-efficacy and limited levels of academic preparedness are less likely to do well in instructional programs designed primarily for middle class students.

Even Great Britain's Open University, perhaps the best model we have for distance-learning through the use of telecommunications technology, has not been very successful with non-traditional students either. While recognizing our British colleagues' achievements in attracting and retaining large numbers of students, their record of accomplishment with the disadvantaged is a bit less impressive. Throughout its history the Open University has always done much better with students from the high grade white collar occupations, especially teachers and other professionals without advanced degrees. Of the 5,843 students who graduated in 1979, only about 11% were from manual and routine non-manual occupations (compared with 42% who were teachers). In addition to the problem of attracting relatively smaller numbers of students from educationally disadvantaged groups, studies conducted by Alan Woodley and Naomi McIntosh of the OU's Survey Research Department show that such students do significantly less well once enrolled than their counterparts from the more socially elite classes; in fact, on the average, only three in ten go on to graduate (Woodley, 1979). Non-traditional students at the Open University drop out for all kinds of reasons: lack of support from their peers, personal and financial pressures, job instability, etc. But there seems to be a general sense of recognition among the faculty and staff that the distance-learning courses are themselves at least partially to blame. As John Ferguson, former dean of the arts faculty put it, "Despite all our profession of openness, our courses really are from the first geared in to the grammar school student. We assume not merely literacy, but experience in continuous reading and continuous writing, not merely numeracy but a considerable amount of sophisticated numeracy" (1975, p. 151).

Given the generally poor quality of the existing research on telecourses in America, and the lack of information about the success rates of non-traditional students who enroll for them, it is extremely difficult to speculate about exactly what we should be doing to increase participation among members of this underrepresented group. For in addition to the theoretical and pedagogical issues I mentioned before, there are also questions of economics and academic politics. Campus administrators and television producers need large numbers of students to justify the cost of telecourses at this stage of their development. Like their counterparts in commercial television, it is still a kind of ratings game. By going after the non-traditional student market, a poorly defined, amorphous group at best, they would court disaster by narrowing their audience too dramatically. Courses geared exclusively toward the teaching of developmental skills are extremely costly to produce and deliver, and require intensive human follow-up to be successful, which obviously increases the local cost of delivery and support, and makes them less attractive to prospective campuses for acquisition. Politically, it would be disasterous in another way: at a time when telecourses are struggling to establish their academic respectability, it would be potentially suicidal to focus on the outcasts, whose level of participation has always been small and whose drop-out rate historically has been very high. Yet despite all this, I think we ought to give it a try.

If we really intend to do more than pay lip service to the dream of extending access to higher education in America through the use of the new telecommunications technology, I think we need to go about it in a far more systematic way than we have up to this point. First of all we need to determine precisely the sort of contribution telecommunications can make to the delivery of special kinds of courses that meet the real needs of non-traditional students. Borrowing from our colleagues in commercial TV, we need to conduct sophisticated ascertainment surveys to determine whether existing telecommunication formats are adequate to the task. Would telecourses in English for non-native speakers, in developmental writing for the poorly prepared, in reading for those who have barely gotten beyond functional literacy, really make an impact in extending the educational franchise? Would a national effort to involve recognized scholars in communications theory, rhetoric, reading and composition in telecourse production have a significant effect on the way these subjects are taught to non-traditional students throughout the country, while gaining acceptance for the way they can be taught through mediated instruction?

To determine if such an effort would have an impact on retention among non-traditional students, we also need to organize a national system of telecourse information collection and analysis, using a common reporting format and qualified researchers from across the land. In order to know how we can enhance the effect of telecourses on underrepresented groups, we need to know more about how we are doing now, by designing systems of data collection that are not subject to the parochial protectionism of local administrators but that contribute in a scientifically valid way to a better understanding of the obstacles that currently limit our broader educational purposes.

Finally we need to ensure that future efforts in this direction will not be driven by numbers alone, but by a real commitment to learning more about the capacities and the limitations of the new telecommunications technology, especially as they can be applied to meeting the needs of the non-traditional student. As long as we base our plans on gross enrollment projections, without looking at demographics and varying levels of achievement, without scientifically determining the various learning needs and creating the necessary systems of tutorial support, our record of accomplishment among those students who need our help the most will continue to be inadequate. Unless we undertake this sort of national research and planning effort, and later efforts in production and evaluation, the hope of extending access to higher education through mediated instruction will remain what it is today for hundreds of thousands of non-traditional students, a dream deferred.

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THE UNIVERSITY AND DECLINING BUDGETS:
TOWARD AN INSTITUTIONAL RESPONSE

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Institutions of higher education have been facing a position of severe fiscal stringency for several years, as declining enrollment and an uncertain economy erode the traditional bedrock of financial support. Furthermore, for public institutions in particular, the impact of shifting political priorities has begun to be felt sharply as budgets for higher education tighten following the wave of taxpayer revolts of the 1970's (Williams 1983). These trends appear to apply not only to post-baccalaureate educational systems in the United States and Canada, but also to those in Western Europe. For example, the Thatcher government was widely criticized in educational circles in 1981-82 for its controversial cuts in government grants to various colleges and universities, particularly some of the newer polytechnic institutions.

Frequently, controversy about the impact of fiscal constraint concerns not the necessity for cutback, but rather the desirable means of achieving it. This paper presents an approach to dealing with reallocation of resources and redirection of university programs in uncertain financial times.

Declining Support

In some public systems, overall funding levels are largely dependent upon student enrollment figures. While some cushion may be available from grant monies, Federal subsidies, and related sources of "soft" monies, institutions in such systems are tied into the overall demographic patterns of the population which they serve.

It is well understood that the growth rate of the "traditional" age college-bound cohort group is quite small; furthermore, many young people have questioned the utility of a university education in an economy where jobs are scarce. In short, educational planners generally have forecast a continuing downward trend in total college enrollments until the mid-1990's. This situation, coupled with political uncertainty, renders reduced public funding a probable chronic and persistent reality for colleges and universities for a considerable time into the future.

Administrative Response Profiles

Administrators will be faced increasingly with allocation decisions involving declining resources (or, at best, a "steady state" condition). There are a number of alternative institutional responses to these challenges of scarcity, parallel to those identified in the business literature (Kotler 1974). The following classification characterizes university administrators in terms of different observable response profiles:

1. The "status quo" administrator expects the crisis to be temporary and, assuming that the traditional path will be resumed quickly, makes no attempt to modify existing plans and programs. This response is typified by a total disinterest in quantitative

measures of performance.

2. The "desperate" administrator grasps in panic for any trend that might seem to hold promise and, in such haste, clumsily throws aside programmatic elements that are basic to the university, though not necessarily "popular" at the moment. This administrator is a "chartist", influenced primarily by quantitative data.

3. The "fatalistic" administrator is convinced that the university will be plagued by a permanently cyclical environment in which some form of crisis will be occurring every year. This administrator gloomily sees no hope of ever returning to the easier times of past periods when growth was the norm and few questioned how resources were being used; rather, the response of this pessimistic administrator is one of preparation for an era of limits.

4. The "resourceful" administrator believes that there are opportunities to be found and exploited aggressively as traditional support shrinks. In particular, this response is a positive one which welcomes the challenge to create new programs and adjust others to meet emerging needs.

5. The "adaptive" administrator recognizes the need to be flexible in making a response that is really tailored to the particular change. This administrator utilizes contingency concepts, and has regularly reviewed the situation being faced. The adaptive administrator has developed long-range plans and has available an effective management information system in order to be able to respond by making program adjustments when the evidence clearly shows that the university faces a particular new environment.

Both the "resourceful" and the "adaptive" administrators have remained flexible in their attitudes, rather than allowing themselves to become bound to a particular point of view. They are both much better equipped than are the other administrative types to cope with the multiple scenarios that might unfold. "Resourceful" and "adaptive" administrators are poised to take action that will move their institutions ahead responsibly despite external fiscal pressures. Among the elements that effective administrators will consider in approaching changing institutional circumstances are the following: evaluation of mission and of programmatic quality; decision-making for reallocation of resources; and management of the intra-organizational process of change.

Evaluation of the Situation

Certainly, a prerequisite to an effective adjustment to fiscal stringency is the acceptance of the condition as a reality. Coupled with such an acceptance is the realization that positive action can be taken, that decisions can and must be made during the crisis. In fact, the situation should be used as an opportunity to reflect upon the institution's mission, to challenge its traditions, and to measure the effectiveness of its programs. In short, it is possible under such circumstances to move toward a redirection of the university that might, ironically, be more difficult to accomplish (or even to propose) in better times.

The quality of educational services provided by a college or university is influenced by a number of factors, only one of which is the level (and constancy) of financial support. For example, the institution's academic standards, its expectations of student performance, and the professsional reputation of its faculty are critical, just as are the overall mission of the institution and the balance of its programmatic offerings. Thus, quality does not necessarily decline in direct proportion to cutbacks made in funding since it is influenced simultaneously by multiple interacting determinants.

Reallocation of Resources

A common response to budgetary reduction is to propose "across-the-board" cuts of comparable proportions to all units. This reaction is one which avoids making hard choices and setting priorities and, by postponing taking such decisions, simply passes the trouble on to a later date (or to other groups) when the institution is likely to be in an even weaker state.

Such evenly proportionate reductions are not inherently equitable, since there are likely to be some programs which can more easily absorb cuts than could others. Furthermore, there may be some which are so critical that they should remain relatively unscathed despite the financial emergency. The popularity of the "across-the-board" response is due to its perceived "fairness" to all concerned, based upon the assumption that the pain is lessened if all suffer to the same degree.

Yet, it is preferable to risk administrative discomfort by making the reductions in line with some sense of university programmatic priorities. The National Commission on Higher Education Issues concluded that such blanket cuts are a serious threat to quality: "Administrators who take a litle from all programs will run into less resistance than will those who try to establish priorities. Yet even over a relatively short period, the practices of the former are far more likely than the latter to threaten the quality of the enterprise" (Scully 1983).

Programmatic Considerations in Resource Allocation

In making judgments about the relative importance of various academic programs, a careful analysis should be made of each unit based upon a set of explicit criteria. Assuming that the primary objective of the resource allocation process would be one of maximizing quality of a balanced set of programs appropriate to the overall mission of the university, criteria to be used in decision-making could include the following mix of quantitative and qualitative factors:

1. trends in enrollment, including national patterns in each discipline;
2. student:faculty ratios relative to comparable institutions for each discipline;
3. patterns of attraction, retention, and attrition (measures of success in recruitment, students in the major, and those continuing on to graduation);
4. centrality of each program to the university's mission;
5. role of each program in general education breadth

requirements;

6. structure and composition of the curriculum of each program in relation to contemporary state of knowledge and practices in the discipline;
7. interrelationships supportive of other academic programs in the university;
8. activity of each program in graduate studies, if applicable;
9. involvement of each program's faculty in professional activity and advancement of research;
10. perceived quality of programmatic offerings of each unit (e.g., as indicated by accreditation reports, special ad hoc reviews, etc.)

The approach of utilizing programmatic considerations in resource allocation decisions poses some difficulties. For example, a formula-based method relying strictly on quantitative factors can quickly yield figures which are seemingly "objective". Yet, such a model is not free of bias, since it is itself determined by the choice of included variables and the judgments made by the modeler about expected levels of performance.

Managing Institutional Redirection

In fiscal environments where total budgetary support is tightening, substantial programmatic growth can only be funded by an internal reallocation of resources. Some faculty may be threatened with job loss or reduction in teaching time as resources are diverted to other programs. To minimize the impact of this severe dislocation (and to avoid outright layoff if possible), faculty development efforts should be prepared to anticipate the change before it takes effect. Opportunities for retraining should be provided and faculty should be permitted and encouraged to transfer gradually into other units of the university where they could be productively employed as their new skills emerge.

In those cases where layoff is unavoidable, the university should emulate the "outplacement" activities found in private industry by helping these individuals make the transition to employment elsewhere, in or out of the academic world. The institution must remain sensitive to the plight of faculty being lost, particularly since their departure is being caused by circumstances beyond their control. The necessity for staff reduction should in no way be seen as a diminution of the value of the professional contributions made by the faculty member to the university.

By planning ahead for needed career shifts of faculty members away from their original areas of competency into new fields, the university can protect the institution of tenure. While the concept of tenure would need to shift toward a notion of tenure in the university (instead of simply in a single specialization), its basic role as a protector of academic freedom would be preserved.

The adjustment involved in university programmatic redirection demands a carefully developed long-range plan in which changing institutional priorities are clearly outlined and supported. All parties who will be expected to be responsible for implementing the changes should be able to be involved in some way in the planning process since they will be charged with the task of explaining the necessity for redirection.

By encouraging such participation, administrators will be more likely to reduce institutional barriers and other forms of resistance to change that might be anticipated. Cooke noted that the process of change is slowed when managers are unable to persuade others: "Managers may not be able to convince members that the organization's performance needs to be improved and that a change has to be made; members may resist change on the grounds that it is risky and unnecessary. While nonprofit organizations experience strong pressures for change, they also experience strong pressures for stability" (Cooke 1979).

At the same time, Drucker has argued for explanation and understanding by affected staff of the need to change: "Resistance to change is grounded in ignorance and in fear of the unknown. Change has to be seen as opportunity by people--and then there will be no fear" (Drucker 1974). Thus, institutions should begin to prepare for a continually shifting environment by designing systems of planning and decision-making that allow flexibility in response. Administrators must assess their institutional circumstances seriously and follow up this realization with a search for solutions that seek needed new directions without sacrificing the essential programmatic base of the university.

In this way, "resourceful" and "adaptive" administrators will seek to respond to Drucker's challenge "to create, build, and maintain the innovative organization, the organization for which change is norm rather than exception, and opportunity rather than threat" (Drucker 1974). By being prepared to respond to change in a positive way, administrators can help maintain quality while the university moves in new directions in its institutional evolution.

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BEYOND MANAGEMENT: HUMANIZING THE ADMINISTRATION PROCESS IN HIGHER EDUCATION

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A perusual of professional journals for higher education reveals that university administration at every level faces complex and pressing problems. A core problem linked to many tangential ones is university governance.[1]

The relative capacity of the university to address contemporary issues is overall directly related to the effectiveness of department management; for it is at this point in the administrative hierarchy that the academic and administrative interests of the various constituent groups comprising the university converge. Consequently, the focus of this case report is on a set of administrative practices designed to enhance the management effectiveness of a department head with spacial emphasis on personnel management; a most basic issue within the decision-making hierarchy. An administrative approach titled humanocracy is presented which has as a major premise that the goal of any university, as a bureaucratic organization, must be the development of its human resources; a goal that should be placed in balance with other university goals of productivity, rationality, standardization and accountability. An explication of the ten principles comprising humanocracy as a kind of inverted bureaucracy will be followed by the preliminary findings of a two year demonstration project, using this management approach at the departmental level at two U. S. universities.

A reader of the best seller Zen and the Art of Motorcycle Maintenance[2] will recall that Pirsig uses the motorcycle as the microcosm of a "high technology society" and contrasted the attitudes of two groups of persons toward the motorcycle and its care: the "classicist" type and the "romantic" type. The classicists are depicted as persons infatuated with the mechanical structure and rational organization of the cycle who derive as much satisfaction from the cycle's maintenance as from its transportation. The romantics, on the other hand, are depicted as persons threatened by the mechanical structure and complex organization of the cycle,who are repelled by the maintenance requirements of the cycle and perceive only the cycle's capacity to provide both "thrills" and affordable transportation.

The modern university, like the motorcycle, can be viewed as a complex machine, based on principles of rational organization, which require considerable "maintenance" (management) for its continued functioning. Within a university, both the "classicist" and the "romantic" types can be found.

In this essay, the position is taken that the two schools of thought (translated into administrative approaches) cannot be "integrated," but that they can be placed in "balance." Reason and intuition may not be one and the same, but they have the potential to be complementary.

The "new management" approaches appear to be a mix of classical Weberian bureaucratic organizational theory[3] coupled with humanistic-oriented practices and new data-based management approaches which rely on the computer as the core tool.[4] Reliance on the classical organizational model persists.

The very choice of a bureaucracy as an organizational model produces a range of costs which management is expected to minimize. The irony of this classical organizational model is that the model seems to have been elaborated to "cure the problem" which the model itself tends to exacerbate. For example, the decision to "consolidate" (centralize) university administration results in a number of problems common to large, complex organizattions. In a recent article in the Futurist, Elgin and Bushnell[5] cited problems created by bigness alone. Problems especially relevant for a university include: diminished capacity of an individual to comprehend the overall system, declined access to decision-makers, dehumanized interactions between people and the system, and less overall performance of the system.

If bigness produces or exacerbates all these problems, and in all probability additional others, should we not design an organizational model that would reduce or eliminate some of these costs? The alternative organization model we present - humanocracy - is based on a theory of "inverted bureaucracy," defined by a set of contrasting principles to those previously cited as characterizing bureaucratic organizational theory.

Principles of Humanocracy

I THE PRINCIPLE OF THE PRIORI HUMAN SOCIAL PURPOSE OF SOCIAL ORGANIZATION

This principle, as suggested by the assumptions, simply indicates that the first purpose for which people gather together is to confirm and enlarge upon their social natures. It is this act of social interaction that distinguishes the human animal. Social (human) development is of co-equal importance to any economic or material reasons for human grouping, in either formal or informal organizations. The human development principle of organization suggests that the administrative processes and procedures would optimize the quality of human experience of faculty and staff with reasonable concern for costs and resource expenditures.

II PRINCIPLE OF HUMAN SCALE

Earlier, problems were cited as being associated with organizational bigness. The principle of human scale speaks directly to the fact that there is a limit to the size of an organization, if human development is a consideration to be facilitated within the organization.[6] No fixed number of people can be specific that demarks human scale from depersonalizing bigness. As a rule of thumb, an organization appears to become impersonal and bureaucratic when management/staff/stucents do not know or cannot relate to others in the organization beyond their job roles.

Human scale affords the potential for human development because it makes human intercourse possible on a personal, as well as professional level. Obviously, not everyone in an organization must be friends or social companions.

The conditions ought to be present, however, to make this easily happen, if desired.

III PRINCIPLE OF HUMAN NEED SATISFACTION

If we think of an organization in terms of being people-centered, then we need to develop an administrative process that can contribute to meeting the basic needs of people associated with the organization. Ego psychologists tell us that people generally need a clear sense of their personal identity, respect for their individuality, a positive self-concept, adequate love and support, some reasonable control over their own destiny, and opportunity for challenge, and a sense of security.[7] Such ego needs serve as guideposts to how the administrative process and procedures whould be organized. Generally speaking, administrative practices that acknowledge needs for individualization, positive self concept, affection, challenge, and security do not add to administrative costs. It is the administrator's attitude and the quality of the milieu that is established that produces the context in which human need satisfaction can be satisfied while the work gets done.

IV PPINCIPLE OF PARTICIPATION

The centralization and specialization of decision-making in bureaucratic organizations produces relative efficiencies in the decision-making process. It allows for decisions to be based on complex data collected and analyzed at a central point and produces a certain uniformity in decisions throughout the system.

A healthy administrative model requires a broad base of participation in decision making. At a minimum, those affected by a decision should have some participation in making the decision. The time and effort involved in this "participatory management" process is offset by any down time that is required in selling a centrally made decision or in enforcing a "topdown" directive. If those effected by a decision have a true voice in that decision, selling worker "cooperation" is unnecessary and enforcement is not a problem, since involvement produces a sense of identification with and loyalty to the organization.

V PRINCIPLE OF FUNCTIONAL GENERALIZATION AND VERTICAL INTEGRATION

Unlike the bureaucratic model which argues that specialization is the key to productivity and efficiency, the opporite will be argued. The problems with specialization are several-fold. "Specialists," those who regularly perform a particular limited function, however skilled, are inclined to experience burnout or plateauing. Life is a matter of rhythm and change, with a core of stability and predictability. Work life is no different. To "generalize" means to build an understanding of a broader range of assignments and to comprehend the work system as a whole.

In the added concept of "vertical integration," is the notion of structuring organizational life so that people at various levels in the organization *take* some responsibility for *some* work effort at other levels. Administrators should not be pure administrators, nor should secretaries be the only persons relegated to typing and filing. While a primary assignment is necessary to provide stability to work flow in the organization, the opportunity to "cross-over" and move up and down in the work hierarchy is extremely useful in building departmental cohesion.

VI PRINCIPLE OF THE AUTHORITY OF MERIT AND LEADERSHIP TURNOVER

The principle is based on the concept of authority by merit, rather than authority by position. It does not seem too radical to argue that leadership should be continually earned through both performance and support of those who fall under the pale of that leadership. Both upward and downward mobility in organizational life should not only be permitted, but, in fact, encouraged.

VII PRINCIPLE OF PRIMARY COMMUNICATION

Bureaucracies are built of paper. They are characterized by their memo cultures and by the fact that they chronically experience a crisis in communication. The very design of a bureaucracy makes communication difficult, since the opportunities for face-to-face communication are reduced. When face-to-face communication is reduced, trust levels drop, and the memorandum becomes a legal or at least quasi-legal document. With voluminous memoranda come information overload and the files to hold them (to prove at a later date that one has communicated.)

Again, it is apparent that it is the choice of organizational design that contributes to the problem. The principle we proposed for education is a communication system built on greater face-to-face communication. No written word ever conveyed what the spoken word, with voice inflection, lip formation, and eye contact can provide. This principle simply argues for the return to the communication basics.

VIII PRINCIPLE OF DESIGN PSYCHOLOGY

While not explicitly stated as a principle of bureaucratic organization, the physical arrangement of most bureaucracies is designed to enhance productivity, efficiency, and a minimization of costs. The "economy of scale" principle is drawn upon when we select cheap, standardized furnishings from a central clearinghouse made from materials with low maintenance requirements. By selecting a single color design—frequently, a traditional government color ("government gray") - such furnishings will less likely be converted to private use and paint can be bought in bulk. Since the buying is centrally handled (a responsibility of one of the functional units of the bureaucracy -- e.g., Purchasing), there is little opportunity for user input or for personal choice of furnishings or arrangements. The result is a flat, sterile, standardized environment which affords a kind of dehumanizing backdrop to the all too common dehumanizing management processes of the bureaucracy.

The counter principle is to design the work environment to accommodate both work productivity, efficiency and human development. A comfortable, attractive, personalized space in no way would be inimical to getting work done. In many ways by reducing the stresses engendered by the sameness and sterility of the bureaucratic environment, productivity and efficiency should increase.[9]

IX PRINCIPLE OF SUBJECTIVITY AND ITS COROLLARIES

Man is a subject, not an object. Objectivity, however admirable, does not negate the co-equal value of subjectivity. Objectivity as a principle produces some severe policy and procedural consequences. Central among these is the "standardization" of organizational policy and procedures which leads to the manualization and the "by book" approach to management.

Unfortunately, objectivity does not address the circumstance of unequal or individualized needs; nor does it provide a framework for a creative solution to this novel problem. The real reason behind "objectivity" is the reduction of human error (albeit prejudice or, ignorance) by reducing individual (human) decision and style. Man is objective only when he acts like a machine. Subjectivity, on the other hand, denies that individualized decisions and approaches necessarily produce favoritism. The organization, based on the machine metaphor, must enforce the principle of objectivity. The organization based on a human metaphor, in contrast would accept a principle of subjectivity. Again, we are not in an either/or situation. Some routinization of policy and procedure is truly essential; but so is some freedom to invent, expand and individualize policy and procedure essential. A humanized approach to administration would allow for significant creative input and judgment throughout the organization by people of all levels. This would hardly produce a state of anarchy, while it might make working in organizations a bit more challenging and satisfying.

X PRINCIPLE OF THE CONVIVIAL TOOL

The final principle in the theory of inverted bureaucracy is borrowed from Iven Illich,[10] a notable critic of industrial bureaucracy. A convivial tool is a policy, procedure or tool that is so simple that most persons can understand and use it without the aid or intervention by experts and specialists. The principle of conviviality is in effect a principle of "simplification."

To humanize organizational life requires a fundamental simplification of policy and procedures and building a resistance to a dependency upon technologies controlled to an elite corps of specialists. This is simply another dimension of the concept "human scale"; all organizations that serve human ends need to be organized on a human scale.

Preliminary Results of Implementing Humanocracy Principles

Evaluative results of the use of the principles are incomplete at this time; only a preliminary listing of the results of this administrative approach using a set of implementing action steps will be highlighted. Final comprehensive results will be available approximately May 15, 1983.

Positive Changes: Increased decision-making using informal structures; updated policies/procedures to reflect current operations; increased enthusiasm/commitment to work tasks, improved staff relationships and work motivation, effort to personalize office/classroom/common space, shift to increased uses of peer review and informal evaluative approaches. **Problem Areas**: Difficulty in generalizing the administrative approach beyond the department, lack of faculty/staff commitment to implementing alternative work approaches - "It is someone else's problem," resistance to shifting in attitudes and from formal routine pattern of decision-making work relationships.

SUMMARY

It has been argued that the theory of humanocracy based on ten management principles offsets many of the problems and costs associated with the bureaucratic approach, without necessarily decreasing efficiency or lowering productivity. For higher education administration, given its service function, the administrative model brings into balance rationalization and humanistic approaches to management. To regard education as simply another "industry" easily fitted to a large organization management model is to defeat the unique function which higher education performs in society.

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    a. Organizational goals are measured largely, if not exclusively, in terms of the total output (productivity) and the efficiency of that output (cost-efficiency of that output (cost-effectiveness or profit margin).
    b. Organizations are expected to grow to a scale that optimizes the economies of scale.
    c. Organizations are expected to be organized in terms of hierarchy of authority, with clear lines of responsibility and accountability.
    d. Authority in organizations is an authority of position (not person), with allegiance and cooperation due to whomever holds the position.
    e. The organization is expected to be divided in terms of specialized functional sub-units, clearly articulated to one another through management control, with specialists assigned to work only within their designated area of specialization.
    f. Decision-making and control are expected to be highly centralized, with specialists responsible for making data-based rational decisions.
    g. Organizational responsibilities are expected to be specified in terms of clear job descriptions and role prescriptions, and to be carried out with total objectivity.
    h. All rules, regulations and operations are expected to be standardized, with uniformity of policy and procedure to assure equitable and predictable application.
    i. The organization's physical environment is expected to be designed to optimize efficiency in production and with respect to least cost.
    j. Communication within the organization is expected to be written and formal and to follow clearly designated lines of communication.
    k. Communication (information) is expected to flow upward in the organization to facilitate top level decision making; downward communications are to be in the form of directives and prescriptions for further rationalizing bureaucratic behavior.
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RESOURCES ALLOCATION AND MANAGEMENT AS SUPPORT SYSTEM FOR TEACHING - AN AUSTRALIAN EXPERIENCE

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Background

University education in Australia is provided in nineteen institutions which are almost entirely publicly established, co-ordinated and funded.

The growth of university education in Australia had slow beginnings. It was not until sixty two years after the founding of Australia in 1788 that the first university was established in 1850. By 1911 there was one university in each of the six states of Australia. It was a further thirty five years before the next university was established in 1946. Since then growth has been rapid and vigorous with twelve universities being established in the next thirty one years. Since the end of the Second World War enrolments have multiplied six times from 26,000 in 1946 to an estimated 165,000 in 1983. The growth was most marked in the 60's but now appears to have stablized.

Demand for university education has reflected changing economic and social patterns and enhanced secondary schooling. In 1946 only about one child in ten completed secondary education, whereas the proportion now is one in three.

Universities in Australia were completely secular in origin and there is only a minor level of private sector funds made to university education. Another difference from some overseas models of universities is that no tutition fees are charged. A more significant difference is that since 1974 the Australian Government has assumed financial responsibility for tertiary education from the six state governments and the national government is now essentially the sole funding authority for expenditure by universities. That support, considerable in the beginning, has now diminished to the point where funds to the universities in 1983 will be less in real terms than in 1982. Diminishing financial support is expected to continue.

With some exceptions, the internal government of Australian universities follows a pattern predominantly of the English model. The pattern includes a supreme governing body consisting largely of lay members together with a group of bodies whose membership is entirely academic or mostly so - bodies often called the Professorial Board, and the Faculties. The nomenclature for superior officers in the universities are those of Chancellor, Vice-Chancellor, Deans and Chairmen of Faculties. The older universities have teaching staff grouped by disciplines into Faculties and the newer universities have tended to adopt schools as the primary unit of organization.

The Australian universities in the 1980's are faced with a number of problems, the major ones being a decline in growth, reliance on one funding authority, the national government, and a new environment where university staff are having to cope with problems, not of expansion, but of no-growth.

The management function in universities has accordingly changed from coping with problems brought about by the pressures of expansion to seeking solutions to the maintenance of services and standards with restricted finances. In order to maximuze the use of available resources, new forms of resources allocation and management are being developed and particularly by the University of New South Wales, the largest university in Australia. The changes being made are significant and affect both academic and support areas with correspondingly significant changes in the general administrative organization of the university and the manner of providing teaching services to its students.

The Context

Developments in teaching and research are usually, and appropriately, the subject of comment and analysis by academic staff of a university. The role of the university administrator is seen usually, and appropriately, as supportive to the functions of those in teaching and research. However, the views and actions of administrators can have a marked affect on bringing about changes in the internal activities of a university.

This paper reflects the perspectives of an Australian university administrator about various means taken to improve university teaching in an environment not unfamiliar to those in universities in other countries - shrinking funds, a lessening of political sympathy and a decline in community acceptance of the worth of universities. One further distinctive aspect of Australian university education should be noted. Academic administrators - the vice-chancellor and his senior academic staff - are usually not trained professional managers. Administrative expertise lies with the senior non-academic staff whose role it is to proffer professional advice to the academic administrators for the support and maintenance of the university's teaching and research.

Resources Allocation and Management

While growth was the dominant theme in the 60's and 70's, government funds to the universities were determined on a formula basis and the distribution of these funds to units within the university was controlled by the central administration.

Formula budgeting provides a reasonably uniform method of distributing funds from governments to the various universities. The major factors used in the formula in the Australian model, compared with the complex formula in other countries is a simple one but it has the same major aims: the accumulation of measurable data from institutions; using mathematical calculations reduces the impact of subjective evaluation; being objective in nature it identifies the needs of all universities in comparable terms;

and it places financing on a per student basis by level and discipline for each university.

Formula funding remains attractive to governments but has lost appeal among educationalists since the formula is too readily responsive to changes adversely affecting a university's capacity to maintain its teaching with declining enrolments. As enrolments rose budgetted funds for teaching increased but as enrolments have declined the levels of funding have decreased on two fronts - the enrolment shrinkage and changes in the unit value of the funding amount from governments.

Along with the uneasiness felt about formula funding from governments in a declining market, those involved in senior management at the University of New South Wales began to recognize that some re-examination of the funding methods within the university should be made. For a long time resources distribution to the faculties had been made, not by a formula approach - although the university had received its funds on this basis - but by seeking to maintain past allocations and patterns of support without giving sufficient regard to the changing demand for the university's services.

The impetus for bringing about a change was a growing acceptance for the notion that decisions about the allocation of funds to academic programs are best made by those most closely involved in carrying them out, and the recognition that existing patterns of support for teaching were subject to challenge on the grounds of inequity and over-responsiveness to pleading for special interests. While university planning inevitably relies heavily on input-initiated systems, insufficient regard was being given to the cost effectiveness and efficiency of high resources users and to the effects on morale and teaching methods of those receiving inadequate resources.

A Changed Method of Resources Allocation and Management

Consequently there began at the University of New South Wales - and now being developed in varied ways in other Australian institutions - a new method of resources allocation and management. The beginnings of the new system were in 1979. The changes had a two-fold major aim - to ensure that academic and financial planning would be more closely linked and to provide the means for coping with the decline in funding which was by then judged unlikely to be arrested.

The new system introduced incentive-based budgeting to the faculties, making them responsible for the global sum of money directly allocated to them to meet their general operating expenses. The acceptance of decentralized authority and administration began to move a system with strong central controls to one with a responsibility centre management orientation where deans with minimum central administrative constraints were able to make decisions about the use of funds allocated to their faculties. This change was a major shift since the centralist notion had long been entrenched in the pattern of university government and funding.

The procedures for determining financial allocations to the faculties involves a funding formula but it is more sensitive to the particular needs of individual units and is subject to regular review to better reflect changes in the demands for the university's teaching services in its varied programs.

Opportunities and Constraints of the New Approach

A primary role of university administration is to provide a support system to enable academic staff and students to concentrate effectively on their teaching and research role. Where that support is centrally based it has the tendency to lack the ability for immediacy of response and an awareness of differences [illegible] it seeks uniformity of approach to diverse teaching elements within [illegible] university.

The new responsibility centre management has begun to ameliorate the adverse bureaucratic effects that administration makes on academic staff. With more direct control over their finances and the ability to effect changes within their own areas, deans have been able to devise management structures reflecting differences in the faculties and in their style of operating. Support services now are being more readily tailored to teaching needs and the notion of uniformity of services across disparate faculties has been abandoned.

With the former central administration dominance, the prospects for the professionalization of the management function of faculties were not encouraging. The advice role of faculty administration was largely restricted to responding to directives and initiatives were difficult to have accepted. Responsibility centre management has had a marked effect on the upgrading of the scope and value of advice that can be proffered for teaching staff. With faculty global funding rather than the more normal line budgeting there is an opportunity, not previously available, for teaching staff to contribute to the development of the budget and the professional administrators now are able to develop a range of options for decision by the dean and his senior academic advisors.

The process for the formulation of advice provides a means also for reducing the tension that inevitably exists between teaching staff and administration. As awareness develops that decisions are made less remotely there has been a willingness to evaluate competing options even where their acceptance involves shifting of resources from one activity to another. The striving for consensus among the academic community shows signs of giving way to the acceptance of decisiveness in management areas now that consultation is seen as meaningful.

The credibility of advice has been aided by technology which has facilitated the preparation of databases able to be manipulated by decentralised administration. Where formerly the collection of statistical data reflected the demands of central administration, responsibility centre management is now able to provide parallel and increased data over a wider band of activities. Resistance to data collection has also been reduced as teaching staff have become accepting of a process to which they now have access and which can be used to meet their particular information needs. In this role, faculty administration has become a resource centre for teaching, not only with hard data but with the increasingly important soft data since the faculty information network is small enough to be reliable.

While responsibility centre management has shifted authority and responsibility closer to those directly involved in providing teaching, there remains some major problems not readily solvable by the new approach.

One major problem is the present inability to make more than marginal shifts in resources because of the existing rigidities in resources usage, mainly staffing commitments, which cannot be readily broken. However, in line with the approach now being adopted by the university in seeking to not only provide but also support teaching services according to assessed demand, an examination of all university activities has just commenced. This thorough-going review aims to re-assess the university's past efforts and role and to determine its preferred development for the next few years. Provided the review and planning is widely diffused some major shifts in resources may be supported despite the dislocation that would be involved. The willingness of teaching staff to accept responsibility centre management is a favourable signal that properly managed, changes in the pattern of control and power can be achieved.

Although implementation of responsibility centre management has been handled with a high level of sensitivity by senior academic and administrative staff the level of support services for teaching is under close scrutiny. Faculty staff hold the view that support services should be maintained but regard the level of funding involved as too high and being a cause of the reduction of some academic services. The management response is that changed patterns of operation with consequential economies have resulted from the better use of professionally oriented supported staff. Provided the tension between the two groups remains tolerable and criticism is seen as constructive it is likely that the administrative services will continue to be responsive to teaching needs.

Australian universities are not alone in facing a period of adjustment and in having to cope with unfamiliar circumstances. The careers of large numbers of teaching staff have been made in a growth environment and university administrators have similarly functioned where expansion was the management model. How well universities will be able to cope with the significant changes brought about by a decline in funding and community support will depend upon the performance of both teaching and administrative staff in this new environment. Equally importantly, the ability of both groups will be tested in being able to work together in solving problems that are likely to have significant academic and administrative implications.

The University of New South Wales has begun to confront some of the emerging problems with new approaches to the methods of funding its teaching activities. The results to date are encouraging with signs that academic developments can be enhanced when budgetary considerations are used to assist rather than constrain such planning. Decentralized authority and control for the operation of individual faculties is also proving a suitable means for improving teaching services and the professionalization of faculty administration has shown a capacity to provide more meaningful support for the university's teaching role.

Because of a basically common theme to university funding and control within Australia the experiment with new methods of resources allocation and management now begun at the University of New South Wales has major implications for future patterns of university education. It is not only staff at that university who are likely to be affected by the structural changes being brought about. The developments are being closely monitored by other universities and by the national government.

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CAN HIGHER EDUCATION MANAGE? THE ANALOGUE OF BUSINESS ENTERPRISE

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Another publishing explosion is upon us in higher education. This time, the subject is management expertise. The flow of materials designed to advance "management literacy" appears to be in response to the new condition of decline which will characterize much of higher education during the decade of the 80's. The current assumption is that, while academic leaders could handle the management task during a period of growth, the pressures generated by an era of reallocation and retrenchment will require more pragmatic management techniques tested over time in non-collegiate organizations. Management applications from corporate, non-profit and public administration sectors, where accommodation to alternating periods of expansion and contraction are common experience, may prove beneficial to leaders in higher education. This paper takes as a departure point the premise that there is more similarity than dissimilarity between useful management strategies and techniques found in public and private enterprise systems and those which are needed in colleges and universities. In fact, a close study of business' role in society as well as management theory and practice acquired over the years in non-collegiate operating environments provides an analogue agenda for the problems and challenges of higher education.

As higher education leaders chart courses for their institutions in a different value and fiscal environment, the tested experience of the business organization offers a potential short-cut to effective strategic planning. The literature is ample and the fundamental findings quite solid, both in terms of validity and reliability. The observations of John Diebold(3) offer a good overview of management approaches designed to achieve organizational viability and vitality. He reminds business leaders that they are engaged in politics whether they choose to be or not, and that it is encumbant upon them to tell the positive story of business aggressively to the public. Neither a low profile nor a casual approach will suffice. For example, a reasonably sophisticated public knows the difference between statistics on how many tons of garbage are moved versus whether the streets are clean or dirty. Business leaders must not only communicate, but they must be able to demonstrate results that people understand and value. Brubacher(2) has reminded educators of the same requirement. He points out the fact that many of the great philosophers of education have treated education as a branch of politics. Certainly, management in higher education must convince the public once again that, while SAT scores may be improving, the real results that higher education intends to and does deliver are better communication skills, ability to understand diversity and deal with ambiguity, respect for a democratic society, higher work productivity and civic involvement.

Boards and chief executive officers need to structure their activities in special ways in order to meet this public accountability dimension of their institutional operations, as well as build strategies which anticipate future trends to avoid crisis management scenarios. Diebold(3) calls upon boards to establish two committees similar in prestige and staff support to the traditional and continuing executive and finance committees. These two committees are public policy and corporate strategy, which in combination, would build early warning systems on the one hand and responsive program initiatives on the other hand. Monitoring and responding to the external environment in appropriate and appreciated ways is the bottom line for most organizational structures. In a complimentary fashion, the chief executive officer and other managers must be skilled in the art of negotiation, both to help the board understand opportunities and constraints in operations and to actively assist external constituencies to understand how and why the board and the organization decide on program initiatives, modifications, and eliminations. Surely, this is true for the boards and chief executive officers of colleges and universities as well. A recent Carnegie Foundation Essay(1) highlights the challenge of campus leadership to find the proper balance between the integrity of the academic community and its programs, and the accountability it owes to its various external publics to assist in problem solving relative to the society. Due to its non-profit status, its intellectual independence, its labor-intensive and labor-protective history and tradition, and its relative inability to pass costs along to its primary consumers, management in higher education faces a more formidable task than its counterpart in business in fashioning a flexible strategy to generate ongoing and increasing public support for higher education.

Business keeps in step with public demand and improves its own productivity by spending considerable sums on applications research and development. Clearly, within higher education, the actual outlay for applications research and development is very low and rarely directed at improvement of instruction and/or administrative systems. Higher education institutions are producer-oriented rather than consumer-oriented. Colleges and universities have only recently given serious attention to marketing, retention and placement of students. Research in the sociology of work has consistently identified poor worker-supervisor relationships as the primary source of alienation, rather than boring or monotonous work. In higher education it might prove beneficial to carefully study student-faculty and faculty-administrative relationships as well as faculty-student ratios and class size to determine whether current practices and contemplated strategies to cope with decline are likely to increase or decrease alienation in the academic community. As educational leaders weigh actions needed to manage institutions with a declining resource base, they should ponder the experience of business organizations. Deferred humanism may turn out to be more costly than deferred maintenance to the educational establishment. Both deferrals represent dangerous overhangs for the successful operation of colleges and universities.

Institutions in United States society regularly encounter multiple layers of veto power blocks representing special interests which obstruct priority setting and decision-making. While business organizations confront this phenomenon primarily through the collective bargaining setting and the activities of environmental and consumer groups, higher education experiences dislocations due to its quasi-democratic governance structures. Both business and education find the cumulative impact of government legislation, regulation, and enforcement activities burdensome and diverting. This is especially the care because government direction can change rapidly and policies and their enforcement are often contradictory among federal agencies. In relation to higher education, the Carnegie Foundation Essay(1) concludes that the most serious problem encountered by higher education is the cumulative impact of government intervention. This essay also points to specialized accreditation operating in tandum with license certification by the state as a significant threat to the authority of the campus.

The business perspective which emphasizes short-term performance over long-term plans and success may prove to be a vulnerability of the business enterprise in the United States. While business organizations are driven to this behavior by the demands for profits, higher education makes a similar mistake due to the need to survive in an environment of declining resources. It is curious to note that business enterprise boards seem more willing to operate at a loss, or invest in some high-risk and long-term ventures based on changing circumstances or current resource supply and price disallocations, than higher education boards who cling almost hysterically to the need to finish the year with a balanced budget.
It will take considerable executive leadership and management technique to argue successfully in either a business or educational enterprise for a longer-term

prospective, and real creativity to devise a long-term plan which will be successful.

It does seem reasonable that leaders in higher education, and those scholars who study educational processes and structures, could be well served by a focus on the similarities rather than the differences between business and educational organizations. In order to achieve this goal, certain mythologies about both kinds of organizations need to be dispelled to facilitate and promote communication and collaborative relationships between industrial and academic institutions. The transfer of knowledge to application has been much more successful on the part of business drawing upon academic studies and consultation, whereas colleges and universities have rarely looked to private enterprise as a rich source of operational practices of benefit to them.

A brief look at some management findings from industry may help academics to accept this available knowledge base as one source of guidance in a decade of retrenchment. For example, Schmidt and Posner(9) have recently reported a study of business management values and expectations that seems quite divergent from the rather cynical attitude held by many academics towards profit-center managers. These researchers found that managers rank organizational goals in such a way that "profitability ranks seventh after organizational effectiveness, high productivity, organizational leadership, high morale, organizational reputation, and organizational efficiency." In terms of home life and career for most managers, "home life is a slightly greater source of personal satisfaction." This study also found that managers rate those subordinates higher who have integrity, determination, and competence rather than loyalty and cooperative work styles. Management, as a process, is not necessarily alien to the academic community when it is studied in detail, understood and carefully tailored for educational practice. Often the difference in management between the academic and business community is primarily one involving the balance of activities found in both environments. Madeleine Green(5) has written about the concerns of humanists as they contemplate a "management" assignment in business. She concludes that humanists can be successful in business enterprises, especially if they understand certain fundamental differences between teaching and scholarship, and management. These differences are probably just as applicable to a movement from instruction to academic administration within higher education. The differences that researcher Green identifies include the shift from manipulating substance to manipulating form, that is, a shift from personal in-depth study of an issue, to delegation of this function to others. The management transition entails a movement away from solitary work and selected exchange with similarly engaged peers, to a highly interactive or social mode of behavior with many different groups of individuals. Charles Garfield's work(6) on the factors which distinguish top performers seems to suggest that educators start out with at least half of the discussed traits identified in his work. Indeed, they possess the traits which business people need most to develop and vice versa. For example, the ability to mentally rehearse coming events and examine the worst consequences of an action seems natural to classroom teachers, especially those used to employing simulations, modeling and case studies. On the other hand, academics may not be so good at bearing rejection and loss well, or rejecting perfectionalism in favor of quick action and decision-making. Some academics would also feel comfortable with a balanced view of quantity and quality while not taking so naturally to designing and promoting training and development modules for others on their staff or the faculty in general.

The analogue provided by the rich experience in management within the business enterprise is not going unnoticed by higher education, particularly faculty in business colleges and entrepreneurs interested in the training and consultation market potential within higher education. In a recent article in EXXON USA,(8) a description of the activities of the Higher Education Management Institute (HEMI) was offered. The Institute has been designed to assist university and college leaders and faculty to understand the management function as it applies to higher education. Data collections through surveys, instruction in the use of various training modules, and consultation are offered by HEMI to colleges and universities. The Management Development Program of the National Center for Higher Education Management Systems (NCHEMS)(7) designs instructional services especially aimed at senior-level administrators and other leaders with campus-wide responsibility and authority. The trend will grow in the future. Whether initiatives like HEMI and NCHEMS will draw extensively from the analogous experience of business, or attempt to create a whole new data base and approach from the higher education environment is not yet clear. It would seem, however, to be a foolish error if management skills and strategies are developed from scratch in ignorance of the rich experience available in the business sector from which to draw. This mistake, in minor form, is represented in HEMI's attempt to use comparative data among colleges and universities without the use of comparative data from more successful models in the business sector. The former is a necessary but not sufficient data test on which to evaluate campus programs. Certainly, comparative data from the instructional units of Bell & Howell, Xerox, Westinghouse and Lockheed would be useful in this regard.

As leaders in higher education attempt to meet the challenges of a decade of decline, the agenda of business as it confronts societal criticisms, and the considerable data and tested practice in management tactics and strategies available from the private enterprise sector offer cost-effective and short-cut learning opportunities. An exchange of information and transfer of knowledge between industry and education would also promote additional collaborative endeavors and a solid base of understanding for both sectors in their outreach attempts to "tell their story" in the United States in hopes of increased public awareness and support.

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THE HOME COMPUTER AS A COMPLEMENT TO ON-CAMPUS INSTRUCTION IN WRITING COURSES

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Rare is the college or university in the English speaking world that does not require at least one course in composition or rhetoric from its students. And in the non-English speaking countries, wherever English is taught, composition is usually considered an integral and necessary part of mastering the English language if the objective is more than just oral communication. In both situations, although to varying degrees, one serious problem is shared: valuable and limited class time with which to teach composition is lost because students' skills related to the mastery of grammar, broadly considered to include punctuation and spelling, have deteriorated or were never sufficiently mastered, and instruction in this skill preempts the time that would normally be devoted to instruction in composition or rhetoric.

Writing is a skill and an art, and, as such, involves the mastery of grammar and rhetoric. The roles of grammar and rhetoric in the compositional process are perhaps best exemplified by comparing composition to an athletic contest. Grammar represents the rules and conventions of the game; rhetoric represents the maneuvers, or the choice of plays that enables a team or individual to score points. Mastery of grammar alone seldom leads to correct writing beyond the limits of the sentence. Knowledge of rhetoric alone is a mere academic exercise. As an abstract body of knowledge, rhetoric can be manifested in written or oral form only through the discipline of grammar. Just as no individual or team wins an athletic contest by mastery of the rules or maneuvers in isolation, no student is successful in mastering English composition by the isolated study of grammar or rhetoric. Traditionally, grammar has been studied by students as the beginning point in the composition process, culminating in the sentence and the paragraph; rhetoric was not formally studied, except in a few high schools with enlightened and energetic teachers, until the freshman year of college, when, it was assumed, fairly, unfairly, or at least in expectation, that the student had mastered grammar. The Collegiate freshman year became and still is, in most cases, the first experience the student encounters where the medieval *trivium* of grammar, rhetoric, and logic are united.

The teacher of English composition at all levels faces a number of challenges. Most students are deficient in the skills of grammar and usage. Yet the instructor is expected to teach composition, building upon the students' knowledge of grammar, "the rules of the game," by adding rhetoric, "the maneuvers of the game." Compounding this binary difficulty is acknowledgment of the fact that rhetoric is being taught before students have been taught to think; hence, a third element enters to further complicate matters: logic, the art of accurate reasoning, of describing relationships. The absence of logic in the compositional process, again in comparison to an athletic contest, is akin to deliberately kicking a football over the opponent's goal posts or dribbling a basketball helter-skelter in mid-court. Acknowledging the traditionally held belief and practice that mastery of sentence grammar precedes the mastery of rhetoric, i.e., paragraph and essay construction, the authors posit that valuable class time for the teaching of composition can be saved by relegating most, if not all, of the instuction in grammar to the "home computer" or microprocessor. The intent of this thesis is not to supplant instruction on the campus in toto as would be the case, for instance, with a correspondence course, but to complement the in-class instruction. The "home computer" can, of course, be located in a dormitory or an office as well as in a home, and the programs in English grammar and spelling developed at the University of Notre Dame can and are being used as out-of-class supplements on the microprocessor.

A part of the overall academic curriculum at the University of Notre Dame is a required year of writing for all freshmen students. This requirement consists of two separate units: an English rhetoric and literature course and a Freshman Seminar course that is humanistically oriented but centered in a particular discipline of study. The students at the University have a wide and varying background insofar as writing is concerned. One of the problems for the freshman writing teacher is to accommodate this wide variety of backgrounds concerning training in writing skills. One way to accommodate this objective is to use the CAI lessons as remedial teaching tools for those students who require such help with certain aspects or the entirety of grammatical skills. It should be understood that the courses taught are first and foremost writing courses. However, it is not possible to teach a college-level writing course successfully unless the student has certain minimal skills in the manipulation of the written word: such manipulation demands a knowledge of "grammar." For purposes of this discussion it is helpful to know the nature of the first course that constitutes the Freshman Writing Program at the Universtiy: English 109, which is the rhetorical and literary segment of the freshman writing course. This course commences with a diagnostic essay which is due at the second meeting, and the content of the essay is used to indicate the student's rhetorical abilities as well as the student's skill with grammatical principles or lack thereof.

The teacher has a relatively wide variety of options to help the student with any problems in grammar. Some of the helpful options include formal in-class presentations by the instructor, handbook or workbook assignments, computer-assisted instruction, individual consultations with students, and the like. With the exception of the computer-assisted reviews, the other options all demand the teacher's time, either in-class or in conferences.

In the teaching of English composition, the principal modes of instruction tend to be lectures and/or discussion groups. The computer-assisted instruction application most readily adaptable to these modes of instruction in composition courses is the interactive review routine. These English tutorials or computer-assisted-instruction lessons cover a variety of trouble areas for students and are contained on a set of eleven diskettes labeled ND1 through ND11. Each diskette holds from five to nine lessons depending upon tutorial length. The student may merely select the desired diskette, and then select the desired lesson from that diskette to operate on the computer. No knowledge of programming is required. The English review routines developed at the University of Notre Dame are tutorials programmed in a multiple-choice format. To each choice there is an appropriately programmed response. These brief responses inform students why the answers they have selected are correct or incorrect. By working through the tutorials, students learn the correct as well as the incorrect choices and the reasons why the choices are correct and/or incorrect.

As a final point, it is recommended, insofar as possible, that the home computer be outfitted with a printing device. The student is thus able to take the output and keep it for a study guide. Teachers may use the output from the tutorial lessons as a diagnostic guide to provide additional aid to the student on certain lessons after the instructor reviews the tutorial output provided by the student. If a student's performance reflects serious difficulty, he or she may be directed to repeat the tutorial, to undertake some additional review activity, or to confer privately with the teacher.

The English lessons available from the College of Arts and Letters of the University of Notre Dame are divided into five areas:

A.	Morphology:	12 modules,	73 principles
B.	Syntax:	12 modules,	67 principles
C.	Punctuation:	8 modules,	49 principles
D.	Phonology:	18 modules,	129 principles
E.	Spelling	13 modules,	76 principles

The lessons may be accessed in any order by the student. A total of eleven diskettes are required to contain the entire system which consists of sixty-three modules.

The teacher utilizes the review modules for several purposes, chief of which are to assess the degree and extent of mastery the student possesses of a particular grammatical principle. Other purposes include to diagnose difficulties and to use the output from the CAI lessons as a teaching aid for commencing a conference to remedy the situation. The teacher may note that a student's essay lacks the proper concord between the subject and the predicate. The error might be the result of inaccurate typing, careless proofreading, or more likely, a failure to understand the grammatical principle of concord. Since there are at least eleven principles underlying concord, and the student may have difficulty with only one or two, the teacher really has no way of ascertaining where the difficulty lies until some sort of diagnostic exercise is completed. The CAI review module serves just such a purpose. After analyzing the student responses in the module on subject-verb agreement, which contains eleven principles and a summary, the teacher can quickly detect that a particular student's problems center on, for example, compound subjects and a subject followed by a preposition; hence, nine principles of concord require no remedial work or review, but two do. Without the CAI module service as a diagnostic, it might conceivably require ten or more essays to pinpoint a student's particular problem within the wide scope covered by most grammatical principles.

As will be noted in the segment following, there is available a complete CAI Author Language for the micro-processor which any teacher may use to create new lessons. To do this, the teacher needs to have no knowledge of computing or computer use, but needs only to determine what specific diagnostic points or objectives are desired. The teacher may then create his or her own lessons for use in his or her own courses.

Most teachers have encountered the chronic misspeller and relegate the student with appropriate admonitions to consult a dictionary, the most inappropriate remedy imaginable. No student deliberately misspells words; some of such errors are obviously due to carelessness and some to laziness: "I'm not sure how to spell this but I'm not going to look up the word in a dictionary" is a common occurrence. It matters little where to place the blame for a student's inability to spell words correctly, whether it be a lack of reading, overdoses of television, or faulty eyesight. The chronic misspeller either does not remember or does not understand the principles undergirding the English spelling system. Completion of the CAI diagnostic module on spelling will quickly reveal to the student and to the teacher the exact nature of the spelling difficulties. Finally, the teacher may use the CAI output as the basis for a conference with the student in which, more often than not, a relatively easy grammatical principle that has plagued the student for years can be mastered within five to ten minutes. Therefore, from the teacher's point of view, the review modules can serve far more than the review exercises found in workbooks. The advantages of the computer review over a workbook type of review are obvious, but prospective users of the computer reviews often overlook their valuable diagnostic and teaching function.

One of the more difficult problems for the beginning user of the computer is to learn a computer programming language. The system described herein provides teaching materials for teachers in a form that eliminates this problem since the tutorials are immediately usable by them. It was determined that this ability would require an intermediate system that would completely separate the teacher from the need to program the computer. Toward th[illegible]nd a completely implemented CAI Author Language for the microprocessor has been developed, and the CAI English lessons are accompanied by complete instructions on the use of the programs that constitute the CAI Author Language.

The Notre Dame Author Language is written for the microprocessor in the BASIC Language. The program that may be of primary interest is the DRIVE PROGRAM, which permits a user to access any module in the lesson series and to use it for classroom purposes. Each of the diskettes contains approximately seven CAI lessons. The user activates the system and calls for the execution of program CREATE/BAS, usually as follows: RUN"CREATE/BAS." This program then selects the module that one requests and executes it. The program is completely self-prompting.

The other programs list the created lesson for proofreading and allow corrections to the created lesson or to listed lessons. One program can delete questions from existing lessons; another program can add questions to existing lessons. Overall, the complete CAI author language consists of the following programs: (1) CREATE, which permits one to create a CAI lesson; (2) USER, which executes lessons for a user; (3) LIST, which provides a hard copy of a lesson; (4) ADD, which adds questions to a given lesson; (6) TITLE, which corrects errors in a lesson title; (7) QUESTION, which changes the text of a lesson; and (8) RESPONSE, which changes the response part of a lesson.

Programs ADD/BAS and CREATE/BAS are complementary programs and are designed to add or to delete a question from an existing lesson. The three programs: QUESTION/BAS, RESPONSE/BAS, and TITLE/BAS constitute the text editor for the CAI materials. As is indicated by the names of the programs, they are used to make modifications in the existing questions, responses, or titles to the lessons.

We began our experimentation with Computer-Assisted-Instruction in Economics, English, and History in 1972. One of our major efforts throughout that period 1972-1980 was to undertake major educational testing to ensure that there was or was not a significant impact on the cognitive and affective domains concerning learning.

The CAI system was initially implemented on an IBM 370/158. It was on this system and in 1973 that Prof. Kline began developing the areas of CAI for the students. As might be expected, given the number of students involved, it became unwieldy if not impossible for each student to obtain individualized instruction on writing problems from his or her instructor. Kline's initial approach was to develop the lessons indicated and to implement them on the computer using the CAI Author Language. After using the CAI materials for over a year a major student and teacher evaluation was devised to gain insight into the use of the English CAI materials in the Freshman Writing Program. The results were quite positive and complemented the other noted studies. At the same time we began receiving requests for materials where the schools requesting the materials had only microprocessors. The combination of the requests for the materials by high schools, primarily with microprocessors, plus the positive results of the major test and evaluation done on the Notre Dame freshman led to our development of the CAI Author Language and English lessons to be adaptable for use on microprocessors.

Again, it was the positive response to and the continued use of the CAI English materials at Notre Dame on the main-frame computer in the 1970's that led us to proceed to implement the same materials for the microprocessor in 1980-81, thus making the materials more readily available. Students were no longer hindered by waiting in line to obtain access to a main-frame dependent terminal, or by computer down time, or by the time of day that the main-frame dependent terminals were available. The conversion to microprocessor adaptability of the materials eliminated all such problems. As the "home computter" grows in popularity and is more readily accessible due to lowering costs of hardware, a trend already in effect, more and more in-class instructional time can be realized for the teaching of composition while the grammar is reviewed outside of class on the microprocessor.

QUESTIONS OF CAI COST-EFFECTIVENESS: THE CASE OF ECONOMICS

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Is Computer Assisted Instruction (CAI) cost-effective? The early enthuciasm and verified instructional effectiveness of CAI during the decade between 1960 and 1974, led many in higher education to believe that CAI adaptations would increase on into the 1980s. This incidence of activity was especially visable in the teaching of economics. However, a recent review of the literature indicates that such usage in economics appears to have peaked during the early to mid 1970s. The primary reason attributed to this decline has been the question of its cost-effectiveness and not its instructional effectiveness. In light of recent technological and marketing innovations in the development, dissemination, and use of mini- and micro-computers along with their concurrent reductions in cost, many of the previously discontinued activities in economics instruction with CAI may now have become cost-effective and should be reconsidered.

This paper briefly reviews the development and use of CAI in the field of economics, summarizes as an illustration of cost-effectiveness one of the two most extensively evaluated CAI projects in economics (PLATO), and offers some comments on the future direction for CAI in higher education in light of the recent substantial decline in hardware costs.

Early Historical Development of CAI

CAI dates back to the late 1950s when the computer industry began using CAI programs to train their own personnel (see Suppes and Macken, 1978 for a more detailed discussion of this topic). By 1960, IBM's early Coursewriter I allowed educators to do some direct curriculum programming (McLagan and Sandborgh, 1977). By 1965, Stanford University's Institute for Mathematical Studies in the Social Sciences (IMSSS) was pioneering the use of CAI in elementary school classrooms (Suppes, 1972) Over the next few years the IMSSS project made further use of the computer in classroom instruction. By the mid to late 1960s, this included university-level computer-based programs.

It was also in the 1960s that the University of Illinois developed PLATO (Programmed Logic for Automated Teaching Operations). In its early stages, PLATO was used in library studies and nursing. CAI projects were also begun during this period at the University of Texas in chemistry, mathematics and computer programming. Also during this time, Flordia State University utilized CAI in physics and health education courses.

The use of CAI in economics began to appear in the late 1960s. One of the earliest reported experiments was by Moncreiff (1965) at Teachers College of Columbia University. In an early review of CAI research in economics, Rodgers (Lunsden, 1967) reported on four such studies. Most were computerized versions of programmed learning materials.

From the late 1960s into the middle 1970s, hundreds of CAI experiments in economics were undertaken most of which were on mainframe central computer systems. As Booms and Kaltreider have pointed out, it was usually "dissatisfaction with typical large class instruction . . . (which prompted attempts) to find a system for teaching large classes . . ." (1974, p. 408). In addition to managing large class instruction, CAI was also seen as an effective method to increase learning and improve attitudes. In a similar 1974 review of CAI in economics, Soper concluded that, "it would seem fair to say that the discipline has made reasonable progress in the development of materials for computer-assisted instruction" (1974, p. 23). Indeed it did, at least into the mid 1970s.

Surprisingly, the progress achieved from the 1960s to the mid 1970s did not seem sufficient to generate increasing use of CAI in economics into the 1980s, at least not at the college level. Since the mid 1970s, very little CAI development and research in economic education has been reported in the literature and virtually no mention has been made of use with the new mini- and micro-computer technology and costs. When and where it has been reported, indications are that when grants and departmental subsidies were withdrawn the CAI projects and activities on mainframe systems were similarly terminated or dramatically reduced. A significant conclusion from Soper's (1974) review article may help explain this condition wherein he noted that CAI, "is expensive and will probably remain so." In short, CAI in economics was not cost-effective given the technology and costs of the early 1970s. These conditions and illustrations can best be illustrated by describing the history and use of PLATO at the University of Illinois.

CAI with the PLATO Study Management System at Illinois

During the early 1970s, with external grant support, the PLATO Study Management System was developed and employed in the teaching of the principles of economics course at the University of Illinois. Six instructional sequences and an elaborate testing and record-keeping system were initially developed for economics on a mainframe computer system. Subsequently, a student seminar and tutorial system was also used in conjunction with the foregoing instructional sequence and testing routines. The results of this varied program are reported herein.

With cooperation between the Departments of Educational Psychology and Economics, a so-called "study management system" was developed for the first course in economics (Anderson, T., et al., 1975). During the first year of the project, 228 students were assigned randomly between PLATO classes and non-PLATO classes. Both groups used the same text, both studied with the same lecturing instructors (each instructor had a PLATO and non-PLATO class), and all students took the same examinations. Students in the two CAI classes were required to go to terminals in the library where, upon signing in, they were given a short reading assignment from the text and were then automatically signed off the system. Upon completing the reading assignment they returned to the terminal and took a short quiz over the materials studied. If they achieved a specific level of proficiency, they were given another assignment and tested, and the process was repeated. If unable to demonstrate proficiency, students were instructed to restudy the assigned material prior to retaking the quiz.

Inasmuch as students could not take graded hour examinations without completing the PLATO quizzes, the process insured that students attended to their "homework" with reasonable faithfulness. "Cramming" was discouraged by limiting access to the terminals. Expectations of positive results from this process were enhanced by some 70 years of research indicating that activities which increase meaningful cognitive processing on the part of students significantly improve learning. The technique of asking students questions (as with the PLATO quizzes) was regarded as one such activity.

The statistical design of the study and the conduct of the courses have been reported upon at length elsewhere (Anderson, T., et al., 1975). The outcomes in terms of achievements, however, are recapitulated briefly in Table 1.

Table 1

	Mean Scores		Standard Deviations	
	CAI (n=79)	Non-CAI (n=99)	CAI	Non-CAI
First hour examination	23.7	22.5	3.34	3.30
Second hour examination	32.0	30.2	4.91	5.89
Final examination	23.0	21.7	3.72	4.54
Standardized examination	17.1	16.6	3.25	3.48

On the first and second hour examinations and on the final examination, students using CAI did significantly better than the control group.

Course attitudes for students using CAI instruction (as measured by a Standardized Course Evaluation Questionnaire) were also significantly better than for the control group. Indicative of their opinions, 90 percent of the CAI students reported that the Study Management System "helped them learn more." In the control group, 23 percent of the students did not finish the course. In the CAI group, 29 percent who enrolled (or attended class and could have enrolled) did not complete the course. Possibly some of the students assigned to the CAI sections--many of whom were freshmen-- may have been frightened initially by the prospect of using the computer. A multivariate analysis of variance involving sex of student, high school rank, cumulative college hours, college grade point average, and year in school did not show a significant difference between students who dropped the course and those who did not.

In summary, the Study Management System used in this experiment resulted in students, overall, learning significantly more (as measured by the testing instruments used) and in improved attitudes toward the course. As judged by questionnaire answers, students perceived they learned more using PLATO because they studied with greater regularity, studied "harder," and because they were required to demonstrate understanding of important concepts.

The second year of the project was devoted to building upon the favorable outcomes of the initial Study Management System. Except for a relatively small lecture-discussion class used as an informal control group, lectures in the course were discontinued in favor of an initial three-week orientation period (using quiz sessions), followed by a number of three-week seminars on a variety of topics of current interest--one of which students were required to participate in during the course of the semester. Three one-hour examinations, which students had the option of retaking in other forms, were administered by PLATO on a flexible schedule. Students were also encouraged to elect an early pencil-and-paper final examination, thereby optimally finishing the course before the end of the semester. Throughout the semester, of course, students read the text and took quizzes administered via PLATO on the assigned reading. Except for the necessity of finishing given blocks of material before taking (and possibly retaking) the one-hour examinations, students could proceed at their own pace.

The statistical design of the second year study and the conduct of the seminars have been reported upon at length elsewhere (Dalgaard, et. al., 1975). The outcomes in terms of the final examination are summarized in Table 2.

Table 2

Final Examination	Mean Scores CAI (n=318)	 Non-CAI (n=64)	Standard Deviations CAI	 Non-CIA
Text-related questions	20.45	18.86	3.55	4.15
Standardized questions (JCEE)	20.52	20.61	4.11	4.98
Graphic models	6.19	6.97	1.83	2.25
Total Test	46.52	45.43	7.87	9.79

As expected, the CAI students did significantly better on text-related items; there was no significant difference on questions from a standardized test of the Joint Council on Economic Education; the non-CAI group scored significantly higher on questions related to graphic models (over which they had more drill in class than the CAI students). Overall, there was no significant difference between the two groups--a finding confirmed by regression analysis. What is important in this "non-experiment," however, is that the Study Management System served as an effective substitute for lectures and for typical quiz sessions. The computer also functioned as an effective substitute for the instructor of the control group. This technology-for-labor-substituability represents potentially significant instructional options.

Several related and important aspects of the CAI system reported here are worth noting. First, the administration of the examinations and the related record-keeping chores performed by PLATO enormously simplified teaching for the instructors. Moreover, of students expressing a preference, 70 percent thought the on-line tests were superior to pencil and paper examinations. The availability of tests comprised of items of proven validity and the automatic keeping of records took a great deal of the drudgery out of teaching a large section of the elementary course. Finally, the second-year seminars were a successful innovation, making it possible for students to study in detail one or more areas of applied economics. Meeting in relatively small groups (15), students had an opportunity to relate to instructors on a face-to-face basis. Fifty-six percent of the students thought the additional seminars either very important or helpful.

Summary

Reported above is clear evidence from a series of carefully conducted studies as to the instructional effectiveness of CAI in the beginning course in economics. These findings agree with another major study in economics involving CAI called TIPS (Teaching Information Processing System), which was initially developed and conducted by Allen C. Kelley (1968) at the University of Wisconsin. Both the Study Management System described above and TIPS attempt to "direct" student activity. Both systems use "surveys" or "quizzes" to focus student attention on important concepts. Both systems provide students with prompt feedback concerning their progress in the course and the possibility of special attention depending upon their performance. Both systems were developed and evaluated on mainframe computer systems. And both systems report statistically significant improvement in student performance and attitudes.

These research findings in economics for CAI effectiveness parallel other recent conclusions found in other fields of study (Forman, 1982). If the Forman findings and those reported here are used as indicators, then one might reasonably conclude that CAI is effective for use in economics instruction in institutions of higher education. But is it cost-effective?

It is important to note that when grants and departmental subsidies were withdrawn from the CAI projects in economics at both Illinois and Wisconsin, the projects were similarly terminated or drastically reduced. The realities of equipment and on-line costs in the mid 1970s dictated their lack of cost-effectiveness. Even today, after millions of dollars spent on development and marketing costs by Control Data Corporation, only seven universities have adopted some form of the PLATO mainframe system.

The CAI projects described herein clearly demonstrate that computer assisted instruction in college-level economics is effective. However, the projects were not continued after external funding ended because they were not cost-effective at that time. The major reason they were not cost-effective was that the delivery systems, terminals and mainframe systems, were so expensive. There was a definite technology-for-labor substitutability (i.e., freeing instructional staff for other educational services) with associated cost advantages, but the cost of the technology precluded university-funded continuation of the projects. Today, the current technological cost factor for CAI is less than 20 percent of the costs when the earlier studies were conducted. This technological cost reduction has been accompained by labor cost increases. Together these factors make CAI-based instruction at the college level not only educationally sound, but financially feasible today.

Traditional faculty familiarity with and existing institutional support for mainframe research computers have also probably contributed to some of this neglect of the new technology, at least in economics. Where such constraints do not exist, the use of CAI with the new cost-effective technology is expanding rapidly.

A recent survey assessed the current and projected use of the computer in U.S. public secondary and elementary schools, with special emphasis on the use of new micro CAI systems (Chambers and Bork, 1980). The authors reported that 74 percent of all districts responding to their survey use the computer in support of the instructional process and 54 percent utilize computer assisted instruction. Furthermore, three-fourths of the districts responding to this national survey indicated that their faculties are interested in developing new CAI programs. While the survey does not report CAI usage by course taught, it does report that CAI is used most extensively in mathematics (by 54% of the districts) with business and social sciences combined second (39%). In projections for the 1980-85 period, the study indicates that nearly 55 percent of business/social

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science departments plan to utilize CAI. The study concludes that in the next decade, "cost reductions due to mass production and consumption for home entertainment and learning will permit cost/effective uses of computer assisted learning in both the traditional classroom and in other settings" (p. 5). Obviously, such conclusions can be generalized for post-secondary CAI as well.

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UTILIZATION OF THE COMPUTER IN SOCIAL SCIENCE METHODS COURSES: A PAINLESS INTRODUCTION TO COMPUTER LITERACY

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The teaching of computer science in general and computer science courses in particular at liberal arts colleges has been heavily oriented in the past towards the natural science or mathematics student who generally thrive on a subject that is quantitativly and mechanically focused. Thus it is not unusual to find that the population of the introduction to computer science course is heavily weighted by physics, chemistry, biology and mathematics majors who already view the computer as an extension of their discipline. Only rarely do many social science or humanities majors venture into this threatening arena.

The threat, whether perceived or real, is generally provoked by the fear of learning side by side with "hard-science-students" (a situation which generated fear early in the junior- and senior high school careers of these people), and that the "stuff" taught in these courses never made sense, i.e., gravity problems, limit problems, volume problems. Social science students, of which psychology majors are often the majority, have generally spent a good part of their student careers avoiding these matters are now not about to subject themselves to such dangers just to become "computer literate". In fact the first line of defense that is often generated is the familiar statement that "we will hire consultants if we need that stuff".

It is not only the attitudes of the students that foster this shying away from computer science education. The problem is exacerbated by the academic discipline from which these students come. Psychology, as is true of the other social sciences, tends to develop its curriculum to "avoid focus" on the need for their students to be exposed to computer science education and sometimes even the general use of computers.

Although there has been some attempt to formally introduce the computer to psychology undergraduate students as is evidenced by: 1- the increasing amount of computer assisted intruction currently being used; 2- the increasing number of undergraduate experimental laboratory courses which use prepackaged experiment programs run on microcomputers; and 3- the increasing number of students who use statistical packages (SPSS, SAS and BMDP) to process their data, there does not appear to be any strongly identified focus on the introduction of the computer to the undergraduate psychology student in general. Most revealing in this light is that a review of 12 research methods books published for undergraduate psychology students since 1980 shows that only two have directly addressed the computer as a research tool.

Despite the curricular development limitation there is a growing use of the microcomputer in many psychology departments and with this use it is unavoidable that more attention to the instructional aspects of undergraduates will not evolve. Perera and McPhee (1982), and Mueller, Gruenenfelder, Robertson, and Carrell (1982) among others have in fact recently presented approaches for interfacing the microcomputer to performing standard learning and cognition experiments. Bird (1981) published a volume on The computer in experimental psychology although, unfortunately without a facilitation, or at least a feeling of adequacy with regard to programming languages, undergraduate students could not make much use of much of the information presented.

Taylor (1980) discusses the role of the computer in the curriculum as being tutor, tool and tutee, strongly urging that students must become more than just a passive user of "pre-packaged" material if they are to make an impact on the displine especially in the areas of modeling, theory building and evaluation, and creative research design.

What follows is a summary of an approach we developed to 1-develop an appreciation of the use of the computer in their field of study by undergraduate psychology students, 2-a facilitation of the use of statistical packages and 3- a development of computer use into higher levels of curricular activity other than just data-processing.

Although a psychology major or two would register for a computer science course each year, the number of our majors who were really being exposed to anything more than merely copying "control cards" for canned processing of statistical data with packages was practically zero. To alleviate this condition we decided to restructure the curricular activities of the INTRODUCTION TO PSYCHOLGICAL RESEARCH COURSE to develop a "need" for the student to want to USE the computer. We elected to have the students use the mainframe unit rather than microcomputers to enhance both the generalizability of the learning experience and to reduce their discomfort with what is perhaps the most threatening aspect of the use of hardware, the "BIG MACHINE" .

Each of the curricular areas in the course that lent themselves to computer applications were taught first conceptually, then by traditional means such as the hand-held calculator, and then by the use of the computer. Each student thus became proficient in the understanding of the concept, the computational method, and the actual computation before ever being exposed to the computer. Each computational activity was outlined using very well developed and tested "user-intelligent/friendly" procedures for the VAX 11/780 and the MINITAB statistical package. The level of difficulty proceeded from the very simple command to the more completed "Let" statements, and then even to some "loop" operations.

All of the students in the class became proficient with the VAX operating system and related utilities (e.g. Mail, Directory, Help and Print) and in using the MINITAB package procedures on the system. All passed their assessment in the use of the packages with a mean grade of 89% and no student received a grade of less than 81%. Students spent a mean of 12 hours of terminal time doing their homework exercises and nine of the fifteen students then registered for the computer science course where programming languages are taught. Similar results were also found in the experimental psychology-learning course in which students were introduced to MINITAB to process their experimental results and plot their data. Students in that class spent a mean of 18 terminal hours and four of the nine then enrolled in the computer science introductory course.

The process for developing computer hands-on experience for our undergraduates has now been more formalized with the development of a procedural manual for introducing all of our psychology students to the mainframe computer and to the use of the MINITAB procedures and programming concepts after they finish the introductory courses. This procedural manual is now used in seven different courses in the department resulting with virtually every student involved in research methods making use of the university mainframe.

There is now evidence to suggest that our courses in cognitive, learning, measurement and perceptual theory have their students working with conceptual modeling and using computer simulation now that there are students who have the capability to partake in the appropriate exercises. The success of the initial program of development has further led to students preparing original research projects and theses which require the inclusion of the computer in other than a data-processing mode.

Some examples of curricular improvement are the reliability and validity studies of students in tests and measurements courses, theme and content analysis of verbal responses in cognitive processes courses, factor analytic studies of personalty types in the abnormal psychology course and signal detection analysis in the perception course.

Many of our majors now regularly use the mainframe for its word processing capacity for their course papers and annotated bibliographies and still additional students have used the system to complete assignments for other courses.

Perhaps one unforseen consequence of this development in computer literacy is that our terminal room is now almost impossible to get into and the university system is now approaching overload because of the unexpected use of so many social science students.

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TEACHING CONFLICTING VALUES TO ENGINEERS

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INTRODUCTION

This paper reports on an experiment to introduce undergraduate students in civil engineering to the complexity of problems in resources utilization and environmental quality, complexity caused primarily by the conflict of human values. I first establish the motivation for such an experiment. I then set out the experiment and its setting. The results and significance of the experiment are also discussed.

THE MOTIVATION

Engineers are damned for what they do and why they do it. For instance, civil engineers build dams, highways and power plants, all spoilers of the environment. In being professionals for hire, they have to follow the wishes of their clients who are the proponents of such projects. Engineers are in this morass because they do not appreciate values held by others. How do we rescue these engineers? One way might be to expose engineering students to the concept of conflicting values. The question is how can this be done realistically, and dramatically. This is a challenge in teaching.

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THE EXPERIMENT

The experiment was undertaken at the Department of Civil and Urban Engineering of the University of Pennsylvania in the 1981 fall term. It should be made clear that at Penn, a predominantly liberal arts Ivy League university, only 20 of the 40 courses needed for graduation in civil engineering are degree requirements. These include mathematics and science as well as all of the civil engineering courses. Environmental engineering is a relatively minor concern; only two courses in the subject are required for graduation. There is really no place in the curriculum for a course in environmental management or engineering ethics. Our experiment took place in a course that traditionally deals with elementary fluid mechanics, hydrology and dispersion modeling.

I introduced human values to the students through a series of "role plays," in which students acted out realistic situations and answered hypothetical questions in a quasi-administrative situation. For example, one of the role plays involved deciding the United States' posture at the continuing United Nations Law of the Sea negotiations over the exploitation of deep ocean manganese nodules. It turned out that when the Law of the Sea Treaty was signed by some 100 nations in late 1982, the U.S. did not sign and it was primarily over the issues of ocean mining that it abstained.

Assignment sheets given to the students (figure 1) included:

- A brief introduction to the problem and issues;
- The question to be resolved;
- The roles to be played by the students; and
- A list of relevant materials on reserve.

For example, the assignment sheet for the MX explained the origin of the next intercontinental ballistic missile, and the President's choice. It might be interesting to observe that a year after these role plays the President is still faced with essentially the same problem.

There were five role plays:

- Manganese Nodule Mining in the Deep Ocean
- MX Missile Basing Mode
- Tocks Island Dam and Reservoir
- ETSI Coal Slurry Pipeline
- Georges Bank (offshore) Oil & Gas Development

Each student had a different role. Materials were put on reserve in the libraries, but some students took the initiative to call the people they were playing to get more details. In two of the plays, I invited outside speakers to present seminars on the topics.

The role plays were "performed" near the end of the term. The student who had the role of decision-maker presided. Each student had approximately four minutes to make a statement. After hearing all the presentations, the decision-maker announced a decision.

These role plays accounted for 20 percent of the course grade and were taken quite seriously by the students. The performances were graded on both factual content of the statements and the presentation, and I awarded prizes for the best pro and best anti arguments. The performances were excellent: students thoroughly researched their roles, worked hard on their statements and gave credible performances.

THE RESULTS

Students were asked to complete an evaluation form (figure 2). Some of their comments are excerpted below.

I asked whether my philosophical messages were successfully conveyed; all students said yes. Among their comments:

- "These messages did come through. I feel that this whole project was a unique and interesting way to learn."

- "I believe that the humanistic effects on different projects are very important and also very interesting."

Students were asked whether the role plays were sufficiently realistic; the majority thought they were. Some comments were:

- "Yes, the problems were all current and realistic."
- "Yes, very good format."
- "Extremely so, the authenticity of the questions was an important part of what made them interesting and fun. But the up-to-the-minute relevance made this my favorite assignment in my four years."

As to whether the materials on reserve were adequate, most students said that they were. Because there were gaps in the available information, I offered to help those who lacked sufficient information. Some students did ask for more help; others solicited outside information on their own. Finally, I asked the students for suggestions for improvement. The two most frequent suggestions were to allow for more time in presentations and to allow debate -- both difficult to fulfill because of limited class time.

In their overall evaluation of the role plays, students commented:

- "The role plays are very interesting and educational, both in learning about the subject and also in learning techniques of presentation."
- "Role play was an excellent opportunity to expand my

narrow mindedness towards the subjects presented. There are always two sides on a coin."

- "It was a great change of pace and something that made this course a lot better...."

SOME CONCLUDING REMARKS

Both I and my students thought this experiment to introduce human values to undergraduates through the use of role playing was a success. It was fun for the students. Society's view of the engineering profession may change if engineers join the rest of society in seeing realities in terms of conflicts, instead of objective rights and wrongs. It is worthwhile for engineering educators to instill this in our students, rather than leaving the job to others.

Perhaps the most important component in the success of the role playing approach was the selection of timely topics. It certainly does not hurt to hand out copies of articles from the New York Times on one or more topics of the role plays. The selection and compilation of relevant materials was, however, time-consuming. Outside speakers gave authenticity to the role plays, and represented an independent source of information and references materials.

What improvements can be made? They are numerous. The next time I will allow more time for each role play; act as the decision-maker myself so that I can ask penetrating questions; and allow controlled debate and questions from the floor. I might even require the students to dress up, and I'll provide refreshments.

FIGURE 1

CUE 460 Fall 1981

MX

The U.S. nuclear deterrent weapon force consists of a triad--land based Intercontinental Ballistic Missiles (ICBM), submarine-based missiles and strategic bombers and/or cruise missiles. The current generation of ICBM is the Minuteman. The Air Force has been planning for the next generation of ICBM -- the Missile Experimental or MX.

One of the primary considerations in planning for the new missile system is survivability. Currently our enemies know the precise location of our ICBMs and have their warheads targeted so as to attempt their destruction, thus preventing U.S. retaliation. Therefore, the idea has been proposed to make the MX a hide-and-seek game without violating SALT II. That is, deploy the MX in such a way that enemy strikes will not wipe out the system. Several concepts were originally considered -- putting the missiles on railroad cars, putting the missiles in long tunnels and putting the missiles on trailers which would move from one shelter to another. The Air Force currently favors the last "basing mode" of multiple shelters.

To have multiple shelters, separated from one another by the order of a mile, for some 200 missiles would require thousands of square miles of flat terrain without shallow groundwater. A moment's reflection will show that even for the size of the U.S., no such land area is available without significant environmental damage. The proposed MX system will probably be one of the largest engineering undertaking in human history in terms of sheer size of land involved, materials and energy used, and the extent and magnitude of environmental damage. Current plans call for MX deployment in areas of Utah and Nevada.

It is not surprising then for many groups to object to MX. Given our common perception of the desert, it is perhaps surprising that many people want that land. Power companies want to build power plants, transmission lines and railroads. NASA wants landing areas for the Space Shuttle. Off-road-vehicle enthusiasts want to tear it up and environmentalists want to preserve it for its subtle beauty.

The President of the U.S. must now make a decision about the MX -- Should we deploy the MX in any one of the three (3) basing modes?

- Buried Trench
- Multiple Horizontal Shelters
- Pools

Figure 1 (continued)

And if so, which one? Where should the MX be deployed?

List of Roles

- President of the United States
- Secretary of Defense
- President, The Church of Jesus Christ of Latter-Day Saints
- Senator Laxalt, Republican of Nevada
- The National Campaign to Stop the MX
- Representative, Friends of the Earth
- President, Martin Marietta Corporation
    Martin Marietta is generally presumed to have the inside track as the project manager for the multi-billion dollar MX program.
- Governor Richard List of Nevada

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FIGURE 2

Evaluation Form for Students

CUE 460 Fall 1981

Feedback on Role Plays

The Role Plays and Risk assignment were added to this year's 460 to attempt to convey the following messages:

- o Natural resources utilization and environmental control problems are complex.
- o Unlike most of engineering, there may not be any "objectively optimal" solutions in these problems.
- o People's values, such as patriotism, greed, fairness, equity, etc. are important in approaching these problems.
- o Personal and professional values may or may not coincide.
- o Facts and perceptions are generally not the same.
- o If engineers are to participate in dealing with environmental and resources problems, we had better be aware of these factors.

I would like your feedback on how successfully this attempt has been.

(1) Whether you agree with me or not, did the above message come through?

(2) Are the Role Plays sufficiently realistic?

(3) Was the information on reserve adequate for the assignment?

(4) What suggestions for improvements would you offer?

TOWARD A DEVELOPMENTAL MODEL FOR TEACHING RHETORIC

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The Assumptions of the Model

A developmental model for teaching rhetoric is based on the assumption that rhetoric involves more than the skills of organization, development, and control of language. Fundamentally it involves a writer who is able to sort through a chaotic wealth of information and make ethical choices about matters s/he is personally and professionally committed to. Writing from this point of view is an intrinsically ethical and cognitive activity; and teachers of rhetoric have traditionally been concerned with the development of the person present in the prose. In my recent experiences teaching rhetoric to juniors and adult learners, I have been exploring ways to implement developmental theory to enhance the students' cognitive development.

Twice I have combined my course in advanced composition with a course in political ethics to make both courses more experiential. That combination was based on the premise that as students develop mastery of ethical norms and learn to apply them through the rhetorical process, they will grow in a developmental sense: they will go from information-gatherers, to critical thinkers, to decision-makers. I have used the insights gained from teaching this combination to re-design a course I teach for Open University which combines an introductory linguistics course with a basic writing course as well as my regular sections of advanced composition. The model has application for both types of composition courses and for content courses with a rhetorical component, although it is probably most effective for interdisciplinary courses where ethical and cognitive development are important goals.

Premises of the Model

Three major premises of developmental theory seem especially applicable to a developmental model in rhetoric. The first is that a student is the maker of his own meaning (Perry, 1981). Simply put, students will hear in a class or read into an assignment that which their expectations predispose them to understand. Therefore, it is crucial to make the learner as active a participant as possible in the teaching/learning environment and to make the course and assignments as experiential as possible. Secondly, learning in a developmental sense requires learners to lose a part of themselves as a new self begins to emerge (Perry, 1981). Such learning is ego-threatening, Perry tells us, and we should allow the student a period of mourning for this loss. If assignments contain a recursive element, students will have time to absorb the changes and to follow their own development, even as they revise old problems.

The third premise flows from these two. To further minimze the threat implicit in such an environment and to clarify what we are trying to achieve with the students, we need to offer them a great deal of support. At the same time we need to balance that support with challenges that push the student towards the next developmental stage. Such a system of challenge and support is the heart of a developmental model (Knefelkamp, 1981). Knefelkamp names four variables of challenge and support in her model of Developmental Instruction: the amount of structure supplied or withheld, the diversity in the amount of work required and the complexity of material to be mastered, the level of concreteness and involvement in the student's experience with the material, and the personalism in the environment which allows the student to feel a part of a community (Knefelkamp, 1981). The recursive element and mastery of content are also important parts of structure, diversity, and experience.

These variables, when manipulated wisely, can ensure that individual students will have their needs respected. I have used the students' essays and conferences to determine the students' struggles with the material and to offer support. I have tried to make the assignments experiential, developmental as they increase in the complexity of the rhetorical task and the subject matter, and recursive. I have seen every student make some progress and many students make important progress toward becoming critical, articulate thinkers. This can best be illustrated by the progress made by students in the courses which combined political ethics and rhetoric.

The Model at Work

A developmental model for teaching rhetoric is centered in the assignments. The other components of the course--the use of class time, the designation and clarification of goals, the clarification of rhetorical concepts and process, and the evaluation of learning--experientially flow from and towards the assignments. In the combined courses, initially my class time was spent illustrating rhetorical concepts; but by the second paper, we spent most of our time discussing the material for the next paper, problem-solving the rhetorical/intellectual, ethical problems in the paper, or critiquing drafts of the paper in small groups. The ethics class was an enormous support for writing the papers, even as my class became an enormous support for students' making ethical choices for that class. Debates and discussions in the other class carried over into mine, sometimes literally, with the whole three hours of the two classes spent in continuous discussion.

These various supports--discussion, debate, problem-solving, peer interaction, intense conferences--are the backdrop for the following discussion of the assignments. With the exception of the first assignment, the assignments were designed to follow the completion of one of six topics in the ethics class:

justice, equality, war and peace, rights, obligation, and property. Each assignment provided students with a specific rhetorical task, a concept to master, and a choice to make. My discussion of these assignments will reflect the mistakes we made in our developmental perceptions as well as our successes. It is also primarily based on our second experience with the course, although I have the thirty-two students of both sections in mind when I discuss the impact on students.

The course began with an essay build on the sentence stem, Politically I am..., an exercise in voice and definition designed to allow the students to begin writing from a position of authority. I wanted students to recognize the impact of their presence in their prose; so I had students xerox copies of this paper for class discussion. The paper immediately drew the class together and made students care about one another. This caring persisted throughout the semester and contributed to the personalism in the class dynamics. The paper also established the basic framework of the courses. The ethics course begins with and subsequently explores the questions of what are the natures of man and of the state and the relationship of the two. We discussed families, experiences, ideas, and those parts of our broader backgrounds that have given us our political perspectives. For many students this paper was important in clarifying an essential part of themselves. At least four students considered this paper the most valuable in the courses. For us, the paper revealed whom we were teaching and what kind of rhetorical and intellectual goals we needed to establish for each student.

The second paper, to answer the question what is justice, was also an exercise in defining a cental issue to the course, bearing on all other ethical issues and on all the papers. The students had read excerpts from Aristotle, Hobbes, Marx, Rawls, and discussed the conflicting perspectives. The two approaches we took to this assignment were revealing. The first time we assigned it we presented it as an exercise in summary and paraphrase with the option of analyzing and concluding, rhetorically an exercise in mastering content and in abstracting. The second time, students had to make a decision about justice. The first time, students were faced with the difficult, but manageable tasks of being accurate and readable with the possibility of reaching conclusions. The second time, and far too early in the course for many, the students were forced to argue a point of view as they made their choices on the basis of their reading, the discussion, and their own feelings. Many students' papers accordingly reflected a naivety, a confusion, or an unwillingness to decide. Nevertheless, we saw the students taking on and engaging with the struggle to become deeper, more purposeful political thinkers.

The third paper on Bridge on the River Kwai, an exercise in critical analysis, asked students to explore whether civilized man could remain true to his nature in a war. We suggested they focus on the character of Colonel Nicholson, the chief British officer and the protagonist of the movie, and his responsibility for the final chaos. In addition to their previous readings and viewing the film, students had read excerpts from Grotius, Lenin, and Gandhi, and had discussed both just war theory and Gandhi's alternative to violent resistance. The film provided a complex, humanistic exploration of the issue of war and peace. Rich in thematic material--culture vs culture, sanity vs madness, civilization vs chaos, honor vs dishonor, to mention a few we discussed--and in believable characters, the film is ambiguous and challenging; it was a particularly exciting experience for the students. They discussed and argued about the film with parents, friends, among themselves, and with us in conference. They arranged another showing. But for many students the film was too rich; we should have provided those students a different analytic chore based on the movie. However, several students thought this the most important assignment in the course; moreover, it dramatically changed two students, one of whom moved from smuggness to openness, the other fully realized the relationship of a person's nature to culture and to ethical choice.

In the fourth paper, a textual analysis of Antigone, students continued with the analytic task of a humanistic work and the exploration of the just society and human nature. Students were to examine both Creon's and Antigone's arguments, the dramatic context of their choices, and determine who had the more convincing position. On first examination, the play looks easier to critique that was Kwai: it has only two major characters, four minor ones, and a chorus who takes the reader through the action. But the play depicts brilliantly the ambiguity of the conflict between the state as a source for order and the individual conscience; and the paper forced the students to make decisions about the citizen's obligation to obey. The students struggled with the limitations of human nature as reflected in both Creon and Antigone. The discussion led to fascinating insights: was Antigone purging the family of her father's curse? What happens when we put the needs of family above the community's? Wasn't Creon's insecurity a significant part of the drama? What is higher law? The students were beginning to see the patterns implicit in the material, and the papers were reflecting that development.

The fifth paper was a researched academic argument on a contemporary issue having to do with one of the first five topics in the course. Two of the issues were the same as we had discussed in class: affirmative action and the draft for the topics of equality and obligation. The others were similar, except for justice which provided the greatest challenge for those students. For justice we chose the progressive income tax; for war and peace we asked whether a just war were possible in a nuclear age; for competing rights, we examined the First Amendment and pornography vs women's right not to be exploited.

Each of the previous papers and discussions were important rehearsals for this paper. Those who chose the draft had already written on obligation; those who chose the war issue had examined war as a human response; all had asked the fundamental questions about justice. We had also worked on summarizing material, on textual analysis, on analyzing arguments, on the structure of argument, and on the research process. In addition we spent a week and a half in the two classes debating the topics and critiquing those debates; and the students had a conference with each of us on this paper.

The papers generally reflected the intensity of the preparation. Students who had been struggling with basic organization and development problems made significant progress in this paper. And although we were occasionally struck by the contradictory arguments in some students' papers, again revealing the struggle they were having with their choices, there were some outstanding achievements in this paper. Most basically, many students did not depend heavily on research for their arguments. They were prepared to be their own authorities. One student who had declared in his first essay that all politics are a matter of self interest, however, did thoroughly research contemporary economic theory to decide in favor of progressive income taxes and presented a justice argument. Another found this paper, again on the justice of taxing, putting all her courses together. Several students learned respect for and made several concessions to their opposition. All but three students had learned to listen and to probe the complexity of an issue and to argue with an open mind.

The last out-of-class essay was an editorial for a specific audience--most students chose the University's newspaper--on their research topic. This paper allows the student to revise the subject of the most intense paper as it introduces the rhetorical issue of audience manipulation and makes style central.

In preparation for this essay, we had read Orwell's "Politics and the English Language" and discussed the inherent power of language and the ethical issues raised by such power. Although this paper, done the last week of class, usually does not get the attention it needs and deserves from harried students, one student has done her best work for this paper, at last letting go of a pompous, jargon-ridden style and finding her natural voice. Others made important choices in re-working drafts, a very bright student leaving out a highly manipulative and trivializing, false analogy between the Nazi system and the draft. Despite the lack of proper attention, this assignment was important to the students' realizing that their writing is also an ethical responsibility.

On the last day of class, students repeated their Politically I am.... essays. Ungraded, this in-class paper was given so that students could return to the beginning and explore what had developed during the semester. The results were very moving. With three exceptions, they saw themselves as different, less complacent. Several thought they had been given valuable tools to make important decisions. Even those who asserted they were the same did so with a tone that suggested they had been challenged by the material. The teacher in the ethics course also felt that the students had gained a theoretical grounding for making ethical choices. From my point of view, they had learned that structure, development and style were all important parts of their authorial voices.

Implications of the Model

There is no doubt that a great part of the impact of this course was the result of combining it with the ethics course. The combination increased all the challenge/support variables. It provided the students an intense involvement from both teachers, increased time for discussion and peer interaction, and subject matter that challenged and motivated students as they learned to approach political decisions ethically and systematically.

Although I have not been able to achieve this intensity in other courses, I have learned to increase the support in them and to plan assignments so students gain mastery of the subject. I now try to design my syllabi with the learner's needs to experience and control the material over time as central, which affects class time, conferences, and my teaching style as well as the assignments. I try to make assignments as experiential, developmental, and recursive as possible. For example, in the course in advanced technical writing I am currently planning, students will choose a subject for several papers, first defining the subject and the issues surrounding it, then proposing a course of action on one of those issues, developing a brochure to sell their idea and finally designing an assignment to attack a rhetorical problem of their own evidenced in a previous assignment. This idea developed from last semester when I had students explore their curriculums through a series of papers which led one student to an Honors' thesis, another to a change of major, and a third to an internship. All left with more mature views of themselves as actors in their education. Through this approach I have been able to enhance development along with the more traditional rhetorical skills. Teachers of content courses can incorporate rhetoric for developmental purposes by making sure there are clear goals, that tasks increase in complexity, and that challenge is balanced by support. The teacher who uses rhetoric wisely will have a highly effective tool for both teacher and learner to measure developmental progress.

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DIRTY TRICKS IN THE CLASSROOM: A CASE STUDY

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INTRODUCTION:

American political folklore is rich in examples of dirty tricks used to gain advantage over an opponent. As such the term "dirty tricks" conjures up an image of either unfair tactics or results or both. They are generally assumed to be negative in intent and unacceptable in a civil society and certainly unfit for the classroom. On the other hand, the virtues of "learning the hand way" are often extolled with the clear implication that what is learned in adversity is not swiftly forgot. Again the emphasis is on the negative aspects of the experience.

This use of a dirty trick is predicated upon the assumption that a dirty trick, properly staged, can be a beneficial teaching/learning experience with positive rather than negative results.

The vehicle for the lesson is a real case which evoked considerable student involvement on the campus where the incident took place. For the purposes of deception, all the facts in the case are misstated.

BACKGROUND:

The setting for the staging of this dirty-trick was an upper-division undergraduate class in "Racial and Cultural Minorities" taught at a major private university in the mid-west. The majority of the students were white and middle class with only a small number of black students. This particular university maintained an ambivalent posture regarding race relations: the student body had a reputation for both involvement and indifference which mirrored that of the institution per se. In that sense, the class was a microcosm of the university.

From the very beginning of the course the primary objective was to develop an understanding of the central concept that discrimination was depersonalizing, that it treated people not as individuals but in terms of their broad categorical anchorages. Students grasped the concept only in its most blatant form, but seemed unable or unwilling to deal with it in all its manifestations.

Very early in the course it became evident from class discussions that the students had already established their positions on the issues encompassed by the subject and were intolerant of opposing points of view. The prevailing sentiment of the class could be classified as socially liberal on civil rights issues in general and race related issues in particular. Indeed, many of the class members had been or were currently involved in a wide variety of social causes.

Those members of the class who did not subscribe to this prevailing sentiment were considered to be unsympathetic to the plight of minorities at best and possibly racists at worst. There was little rational dialogue between these groups as there appeared to be no common ground. Upon occasion, there were flashes of hostility upon the part of the most liberal of the students.

It was these flashes of intolerance which provided the stimulus to develop the lesson.

PROCEDURE:

The class was informed that their instructor had just read about a most interesting case involving racial discrimination in the classroom and would like them to analyze it. They were led to believe that their instructor knew all the particulars and would play the role of the accused for examination/interrogation purposes.

No special instructions were given to the class other than that they were to try to determine the salient facts and they might examine the accused as needed to clarify any areas they wished. They were told they would have to present their findings and recommend a course of action upon completion of their analysis.

The class was then given the brief sketch of the case which follows and were broken in several small discussion groups.

Black Student Association vs. Professor White

1. University: public, mid-west, medium sized, urban
2. Course: European History, introductory level
3. Professor: white, male, middle aged, Ph.D.
4. Class: majority white, few black students
5. Issues:
    a. No black student ever successfully completed the course
    b. Professor and white students were alleged to use racial slurs regularly in the classroom
    c. Allegations and harassment of black students
    d. Black students had unusually high withdrawal rate

6. Actions:
    a. Many complaints were filed with the university
    b. The administration claimed professorial prerogatives prevailed and originally refused to investigate
    c. White students supported the professor

7. Charges: Eventually the university charges the professor with discriminating against black students, harassment of black students, and unprofessional conduct.

8. Accused:

   a. Maintained his innocence of all charges

   b. Claimed he was the target of a "plot" by radical elements because of his race.

DISCUSSION:

The dynamics of the group discussions revealed little or no dissent. At this stage it appeared that black and white, liberal and conservative all were in agreement. The class was called to order and an examination of the accused proceeded.

Questions rarely probed beneath the obvious facts that no black person had ever successfully completed the course and racial slurs were common. As these issues were addressed, other bits of information were volunteered by the accused to further involve the class. A brief sample of the dialogue follows:

Q. "It has been claimed that no black person has ever passed your course. Is that true?"

A. "That is correct."

Q. "How do you explain this fact?"

A. "Your question presumes that those who failed had comprehended the material and were competent enough to pass an exam. There are two things wrong with your presumptions. Firstly, there are serious questions regarding their competence: secondly, this is a course in white history and black people cannot comprehend either the facts or nuances of such a course."

Q. "Do you mean no black person has ever comprehended the material at a satisfactory level?"

A. "Yes."

Q. "Are you further saying it is not possible for a black person to learn the materials, ever?"

A. "Yes. I have often informed black students and counseled them to drop the course for their own good."

Q. "What! You actually told students they could not learn white history and encouraged them to drop out without giving them a chance to try?"

A. "Let me put it more strongly. I told them to drop out or they would fail."

Q. "Did any ever remain in the course?"

A. "Yes, and they all failed just as I predicted."

Q. "It has been alleged that you use racially offensive remarks in class as do many of the white students. How do you respond to that accusation?"

A. "I do not now nor have I ever willfully used racially offensive language nor would I allow students in my classes to do so either."

Q. "You deny this accusation?"

A. "Of course."

Q. "How do you account for the fact that the allegations are so persistent?"

A. "Racial slurs like beauty are in the eyes of the beholder. In sum, I am not going to be held responsible for the misinterpretations of my remarks. Further, I believe much of this so called problem is being stirred-up by a handful of black racists who are out to get me because I am white -- no other reason than that."

The interrogation was stopped at an arbitrary point and the groups returned to their charge. The results were unanimously arrived at with no apparent disagreement: Professor White was guilty on all charges, should be dismissed, the failing grades of past black students should be expunged from their records and they should be re-examined.

At this point the class was informed that the accused was a black professor, the victims were white, and the incident took place in their state university system. Several black students laughed and shouted out the correct name of the accused -- he was that well known. Still other students exclaimed, "That's a dirty trick."

The class was then asked to re-evaluate the case in light of the true facts. The students proceeded to contradict their earlier analysis and began to offer as valid explanations the very ones they had rejected when they believed the accused was white and the victims black. It was now accepted as reasonable that the white students in question might not have been able to master a course in black history; though, it was not accepted that no white could ever pass. When pressed for an explanation as to why no white had ever passed the course, the students offered that perhaps those who stayed in the course were there not to learn but to harass the professor. In affect, the class was agreeing with the accused that he was a victim of racist trouble makers. Finally, the class was asked to explain the racial slurs by both the professor and the black students. It was the general assessment of the class that the professor should have been more careful in his remarks; however, it was also recognized as possible that the white students were either overly sensitive or were intentionally misrepresenting the situation as part of their "plan" to harass the professor. The alleged racial slurs by the black members of the class were considered unfortunate but understandable given their past experiences with whites. The class felt that the professor should have exercised better control over the classroom dynamics to discourage such remarks.

The majority of the class did not recommend that the professor be disciplined nor was he found guilty on the other charges. There were a few students who disagreed and wanted to stand on "principles" regardless of the race of either the accused or victim.

This principle oriented minority became the catalyst for a rather painful self-examination by the majority. The black students were embarrassed that they had just laughed and thought the whole matter funny when they learned the victims were white given how angry they had been when they believed the victims were black. The white students were equally embarrassed by their obvious show of hypocrisy and their sudden willingness to accept as reasonable from a black professor that which they had so completely rejected when they believed that accused was white. The students were shocked that they appeared to have so few principles and were so ambivalent toward "color-blind" justice. All agreed they had learned the lesson well.

At the end of the term when the students evaluated the course, this "dirty-trick" was singled out as one of the most effective learning experiences they had ever had in gaining insight not only into the content of the course but also into their own value systems.

"NEEDS AND MEANS": RESULTS OF A QUESTIONING OF TEACHERS AT THE UNIVERSITY OF FEDERAL ARMED FORCES, HAMBURG

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1. Initial Considerations and Realization of the Survey

It is a well known fact that of the three main functions and duties of a university teacher-research, teaching and administration-teaching has rather inferior prestige. In addition to this little is known about its efficiency for example within a curriculum. For some reasons it has been a long tradition of German universities not to discuss university teaching or even research on it.

Foreign universities especially in the Anglo-american regions usually deal more practical with these problems. In consequence academic teaching is there one of the self-evident objects of research and evaluation (Grüger, 1982).

In the context of these efforts the present survey has to be seen. Comparisons between the conceptions and attitudes of American, Canadian and German university teachers could follow.

The first answers to the rather obvious question which needs of improvement university teachers acclaim for their everyday teaching and which means they wish to realize has been reported from American and Canadian universities (Centra,J., 1976; Biles,B., 1976). In this background Nelson, Foster and Rattan (1979) designed a questionaire and tested it with members of the "American

Educational Research Association" (N=480), with members of the "Faculty of Education of the University of British Columbia" (N=240). The average quote of return was about 30%. While teaching as a guest at TUA (Technical University Aachen) Foster translated the questionaire in cooperation with the HDZ Aachen (Center for the improvement of University teaching). In winter semester 1981/82 it was applied at seven faculties of TUA (Heger, 1982).

Our survey aims at the extension of these results. A parallel survey at HSBw Munich is planned, but has not yet been carried out.

At HSBw Hamburg the questionaire (one-paged), completed with an information leaflet and an addressed return envelope was posted to all teachers of the four faculties: professors and assistens teaching independently or participating in teaching. Considering the strains of the term's beginning and of the examination period at the end of term, mid-term seemed to be the most favourable time for the survey.

2. Features of the Faculties and Return

The overall numbers of teachers and students differ very much between the faculties, as table one shows:

Table 1: Return

	Prof.			Ass.		
	N	N_R	%	N	N_R	%
ET	12	5	42	35	11	31
MB	20	9	45	71	10	14
Päd	23	10	44	21	15	71
WOW	32	16	50	51	20	39
Σ	90	40	44	188	56	30

ET = Faculty of Electrical Engineering
MB = Faculty of Mechanical Engineering
Päd= Faculty of Education
WOW= Faculty of Economics and Organisation

The return quote from the group of professors shows two special features: it is about the same in the four faculties and it is quite high (about 50%) compared with those of other universities. The real return is even higher: six returned questionaires from professors could not be evaluated because of unclear answers.

In regard of this return quote it cannot be certain, if the results are representative for all university teachers of the four faculties, but in some probability it can be said that the results show characteristic features of the faculties.

The return from the group of assistants, on the other hand, seems rather low and conspiciously different between the faculties. This must be seen in light of different arrangements concerning independent teaching and participation of assistants in teaching. In this respect the return quote from the group of assistants reflects to some extend their grade of participation in teaching in the faculties.

The seperate inspection of the questionaires, the need of partial recoding and the removal of a total of eleven questionaires which could not be evaluated, have shown that the used questionaire, which is directly comparable with the Canadian and - in translation - the Aachen version, needs revision in parts. A couple of check-backs from the faculties point out that the answering of some items in the requested rank order did not always seem clear. Divergent from the previous surveys the free answers have been evaluated seperately in this survey.

A revised questionaire with more precise items could have resulted in an even higher return quote.

3. Results

3.1 The improvement needs

Table 2:

Item	All N=96		Prof N=40		Ass N=56		ET 2) N=16		MB N=19		Päd N=25		WOW N=36		TUA N=113	
1)	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R
1	3.2	2	4.3	3.5	3.1	2	3.0	2.5	3.3	2	4.2	4	2.9	2	3.9	3
2	4.9	5	4.3	3.5	5.1	5	3.3	4	5.9	7	5.2	6	5.0	4	4.1	4
3	4.2	4	4.9	5	4.0	3	5.0	5	4.2	3	3.2	2	4.2	3	3.0	2
4	5.2	6	5.3	6	5.2	6	7.5	8	5.2	6	5.0	5	5.0	5.5	5.6	6
5	6.2	8	7.0	8	6.1	7	6.5	6.5	6.0	8	6.2	8	6.7	8	6.4	8
6	4.2	3	4.0	2	4.9	4	3.0	2.5	4.8	4	4.1	4	5.0	5.5	6.1	7
7	2.1	1	2.2	1	2.0	1	1.9	1	2.8	1	1.8	1	2.3	1	2.3	1
8	8.9	9	9.0	9	8.8	9	8.8	9	9.2	9	8.5	9	8.9	9	7.1	9
9	6.1	7	6.0	7	6.1	8	6.5	6.5	5.1	5	6.0	7	6.2	7	4.7	5

1) List of items:

Item 1: work in small groups
2: accept interpolated questions
3: improve planning of lectures
4: confer with colleagues
5: evaluate students' achievements
6: counsel students
7: activate students' cooperation
8: overcome own self-consciousness and nervousness
9: improve the use of media

2) Abbreviations:

ET : Faculty of Electrical Engineering
MB : Faculty of Mechanical Engineering
Päd: Faculty of Education
WOW: Faculty of Economics and Organisation
TUA: Technical University Aachen
Md : median
R : rank order

Table 2 combines the medians of the rating of the nine given items with the respective rank expressing the average significance of the statements. The statements of the different groups are listed in columns. For a comparative preview the results of the Aachen survey are listed in the right column.

At first glance already it can be noticed that the response profiles of the subgroups show some similarity, especially in the ranks classed with the medians. This similarity occurs in the answers of the two status groups as well as the four faculties. The general tendency corresponds to that of the Aachen results. The rank order of improvement needs of university teachers, concerning teaching, can thus be described as follows:
Out of the given items the HSBwH teachers put the stress on a characteristic of university teaching that is discussed controversely in its function, significance and realization: rôle and participation in academic instruction (see Breuer et al., 1975, Sader et al., 1973, Müller-Wolff, 1977).

Throughout the four faculties and both status groups item No.7 (activate students' cooperation) is rated highest. The items on rank 2 and 3 follow the same tendency: item No.1 "work with students in small groups supplementary to lectures/practical instructions" and item No.6 "counsel students".

From the didactic point-of-view this result is interesting, as the teachers express their needs for a more intensive dialogue with the students in academic teaching. Articulation this the university teachers - at least in theory and on the background of their own rôle definition - respond to an important and promising challenge of university didactics discussed in terms of "social learning", "project studies" or "small group concepts". It is widely agreed that these concepts are for different reasons scarcely realized.

This well-known multi-dimensional didactic problem cannot be discussed in detail in this paper (differences between the different curricula, for instance, have to be considered, as well as in teaching on different levels of progress - pre-diploma studies, final-diploma studies).

In this context one interesting aspect needs further consideration: the distinct gap between the expressed needs of teachers for more intensive interaction and, on the other hand, the fact that students do not seem to experience these concepts of teaching in their lectures and instructions.

Previous interviews at HSBwH (Bonnemann, 1980, Bonnemann/Oberländer, 1982; for references to the problem in general see last page) have given some explanations of this phenominon and its specific interdependent conditions at HSBwH:

- Teachers rate students' diligence, achievements and general activity rather low. They mainly experience this in their lectures. Their own rôle in this interaction is that of a teacher, an expert in teaching. Out of this experience the teacher defines his image of the student and the student's rôle. Once fixed, this image is anticipated for further interaction and then seems to be unreversible, if there is no supervision or feedback. In consequence the students have only little influence on this attribution of defiencies. This exactly marks the university teachers's rôle and status definition. A change in interaction between students and teachers effects the described status stereotypes[1] and normally leads to some confusion. A flexible rôle definition thus turn out to be an important didactic competence of an university teacher.

- The specific curriculum of HSBwH (integration of studies into the offiver's career) seems to lead to an insufficient identification of quite a few students with the aims and contents of their studies. In addition to this the specific organisation of HSBwH (the study year, trimesters) requires an extremely concentrated system of teaching.
- The students on other hand experience their teachers as being out of reach with sarcely a chance to talk to them. From their point-of-view they describe the same defiency in interaction. Despite a number of specific arrangements from the very beginning (campus life, small group concept) these deficiency could not be prevented at HSBwH.

It has been shown that there are a couple of explicit and implicit reasons for the described problem of academic teaching. Both, students and teachers are aware of it and express their uneasiness and discontent. Further surveys and discussions are needed.

3.2

At the bottom of the rank order there are two corresponding items. The low rank (rank No 8) of item No. 5 ("evaluate students' achievements") seems surprising.

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[1] It is remarkable, that the offered feedback by means of a standardized questionaire about university teaching was accepted by only few members of the faculty staff.

Though rating this item low, it is unlikely that the teachers do not care much about the evaluation of students' achievements. As the achievements controlls are stressed very much in the curricula of HSBw Hamburg, it is more probable that the system of examination is already established to a high degree not leaving any needs of improvement from the teachers point-of-view.
In light of high failures in examinations in at least three of the four faculties this result becomes significant.
The item No. 8 ("overcome own self-consciousness and nervousness") has been put on the lowest rank. This, indeed, is not surprising.

4. Means of Improvement

Table 3: Means of Improvement

	All N=96		Prof N=40		Ass N=56		ET N=16		MB N=19		Päd N=25		WOW N=36		TUAa N=118	
Item	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R	Md	R
10[1]	4.5	4	5.1	5	4.1	4	4.2	3	4.9	3	4.8	6	4.9	5	3.0	1
11	3.2	1	2.8	1	3.9	1	3.3	2	3.6	2	4.0	3	3.0	1	4.3	5
12	4.2	3	5.0	3	4.0	2.5	4.4	4	5.1	5	3.9	2	3.9	2	3.3	3
13	5.0	6	5.8	7	4.2	5	5.1	6.5	5.5	6	3.2	1	5.3	6	3.2	2
14	5.0	6	5.1	5	5.0	6.5	5.1	6.5	5.0	4	7.0	7	4.0	3	4.3	5
15	5.0	6	5.1	5	5.0	6.5	4.9	5	6.3	7	4.2	5	5.4	7	4.5	7
16	3.8	2	2.9	2	4.0	2.5	2.4	1	2.4	1	4.1	4	4.1	4	4.3	5

1) List of items:
item 10: newsletters on teaching improvement
11: provide additional funds for teaching
12: weight teaching more heavily in university careers
13: workshops on teaching techniques held by HDZ
14: special awards for good teaching
15: team teaching
16: additional technical and personal support

Table 3 shows the rank order of the suggested means of teaching improvements. Again, a similarity in ranking can be observed, though there are some modifications between the groups[1]. The teachers, especially those in the technical faculties, put the stress on items proposing the provision of further financial and personal support for the lectures.

the remaining five statements are ranked differently by professors ans assistants and, in parts, by the faculties. Differences in teaching practice and rated significance of teaching between the faculties (engineering vs. social sciences) could well be a reason for this.

Item No. 13 ("workshops on teaching techniques ...") is particularly interesting. This proposal has been ranked lowest by the professors, the assistants gave it a middle position. While it is ranked rather low in three faculties, it came out as the first, meaning the most efficient of all suggestions, in the faculty of education. The fact, that problems of teaching are the subject of this faculty, seems to be an important reason for this rating.

Another item with a similar tendency (item No. 12: "weight teaching more heavily in university careers") is accepted by more respondants in the social sciences than in the engineering faculties.

Means of improvement as suggested in item No. 14 ("special awards for good teaching") and item No. 15("team teaching") are objected to by the teachers of all faculties. It seems that these teaching techniques are quite unusual in the German university system and would request rather incisive reorganisation of teaching.

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[1] The results of the Aachen survey differs significantly. This is to be connected presumably with their return: "The evaluation ... proved, that mostly those members of faculties took part in the questioning, who had a positive attitude to HDZ-work (Heger, 81,p.1).

Summary

With a brief questionaire it was intended to get information on the university teachers' assessment of a couple of needs and means of improvement in university teaching. The teachers were requested to rank the given items according to their own point-of-view.

Besides this, another reason for the survey was to render comparisons to recent North-American surveys possible. With our high quote of return this seems possible and will be carried out later.

The main results of the present survey are as follows:

As the most important need of improvement the teachers of all four faculties of HSBw Hamburg name students' activation and participation in lectures. As other surveys prove, just this feature is for various reasons a problem of university teaching and difficult to realize. On the other hand both groups in the process of teaching and learning (professors and students) experience a lack in this matter.

Changes in the system of academic examinations as well as the improvement of teaching competence are ranked quite low. In these aspects, too, the respondants of the four faculties agree.

As the most important mean of teaching improvement out of the given number of items the teachers stress the provision of further financial and personal means.

In contrast to the results of the Aachen survey the preferred means of improvement in Hamburg point out "external" modalities rather than "internal" aspects of changes in competence or teaching structure.

An extension and specification of the survey in comparison with others seems usefull.

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TECHNOLOGICAL INNOVATION BY FACULTY: EVIDENCE OF WIDESPREAD ACTIVITY

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Introduction

With the technological revolution exploding around us, there is a recurring debate among observers of the higher education scene. To what extent will faculty adopt new technologies? Will faculty demonstrate powers of resistance similar to faculty behaviors in earlier eras of technological advance (Evans, 1967)? Or, is the technological and cultural momentum behind the computer and the new video hardware so strong that there will be no serious faculty resistance? The thesis of this paper--and the project reported here--is that such questions misrepresent the fundamental educational and human choices facing the faculty member.

The usual dialogue about technology displays a logic antithetical to rational planning and decision-making. First, many, perhaps most, commentators concentrate on whether faculty will adopt new technologies, with the implied assumption that the new technology is an improvement on present practice. This approach to change fails to address the present status, goals, needs and values of the faculty member and fails to incorporate an assessment of the supposed impact of the new technology on the actual conduct of teaching and learning. Thoughtful faculty members react negatively to such a messianic attitude.

Second, technology, as the term is conventionally used, refers to machines and electronically-aided forms of communication. This is a limiting view of technology which often presents innovation as a stark threat to the pedagogical status quo. For the purposes of this paper, "technology" is defined in its broadest sense to mean techniques or methods of teaching (Skinner, 1968;

Kozma, 1978). This definition encompasses techniques guided by machines such as computers and television sets as well as curricular designs and classroom teaching methods. The definition avoids the artificial debate about faculty resistance to adopting new media or computers and, rather, focuses on the more fundamental issue of what faculty are doing to apply new methods--any appropriate methods--to improve the effectiveness of their teaching. The crucial assumption is that the desired technology at a particular point in time is the one that a specific faculty member uses to take a positive step educationally.

How do faculty respond to the introduction into the environment of attractive and relatively inexpensive technologies such as computers and video? How do faculty respond to opportunities to adopt new technologies in their teaching? This paper reports a study of a grants program for faculty at the University of Vermont. Between 1974 and 1981 the University of Vermont made 107 grants to faculty for the purpose of enhancing undergraduate learning. The grants program was designed to induce faculty to introduce new instructional technologies. The research focused on faculty motivations, project characteristics and perceived outcomes.

Profile of the Grants Program

Grant proposals were written by faculty in response to criteria established by the campus-wide Instructional Development Center (IDC) and endorsed by a faculty review committee. The proposal process and format was considerably less elaborate than the usual federal or foundation approach, but did request cogent statements of the problem, goals and intended outcomes. The request for proposals did not stipulate the inclusion of particular methods or project characteristics, except that the faculty member was required to direct the activities of the project. The review committee looked for evidence of innovativeness, need, impact on student learning and generalizability to other classrooms. The proposal process elicited a wide range of instructional ideas, including utilization of video tapes, slide-tape packages, computer simulations, case studies, interdisciplinary organization of content, criterion-referenced formats, academic skill training, computer-assisted instruction, and small group methods. In general, the grants program took a developmental perspective which emphasized the motivations, situations and needs of specific faculty members and the importance of taking a promising step--here and now--toward improved teaching.

A total of $232,535 was awarded to faculty over eight years, with the average grant size amounting to $2,173. An analysis of project budgets reveals the following categories of expenditure:

	Expenditure	Amount	Per Cent of Total
A.	direct salary payments to faculty for summer work (9 month faculty only)	$72,128	31.0%
B.	fees paid to support personnel (technical consultants, teaching assistants, secretaries, etc.)	$78,438	33.7%
C.	faculty travel (visits to other universities, conferences, acquisition of instructional resources)	$ 6,121	2.6%
D.	operating costs (instructional materials, clerical materials, etc.)	$42,280	18.2%
E.	instructional equipment (micro-computers, video playback equipment, cassette audio tape recorders, etc.)	$33,568	14.4%

When a grant required the services of the IDC video production studio or technical consultation from other IDC staff, the grants were not directly charged for these expenses.

By combining categories A and C above, the direct investment for faculty involvement--for faculty development--represents about one-third of the total expenditures. It is important to recognize, however, that most of the grants occurred during the academic year (September-May) and involved investments of faculty time within the regular contract period. By combining categories A, B and C to signify investment in human resources and categories D and E to signify investment in material objects, the human resource dimension represents about two-thirds of the total expenditures. An examination of the equipment purchases shows that about half of the total ($16,213) was spent on computer equipment, with remaining expenditures on video, photographic, audio, calculating, and reading equipment.

Methodology

A questionnaire was developed by IDC staff and the coordinator of the grants program, a released-time faculty member from the Department of Psychology. Domains of interest in the questionnaire included: (1) information about rank and time at the University at the time the application was funded, (2) a Likert scale from non-influential to very influential for responses to varied reasons for applying for an instructional incentive grant, (3) identification of the two most important objectives of the grant, (4) the two most valuable outcomes of the grant, and (5) perceived impact of the project. Of the original total of 107 grants, three grants were extensions of prior grants, one grant was still in process, and six grants were impossible to study because the faculty member had left the university. Thus, 97 questionnaires were mailed to faculty principal investigators. Responses were obtained from 83 recipients, for a response rate of 85.6%. Anonymous identification codes were employed to protect the faculty member's identity and potentially to improve validity in self-reporting.

Findings

The distribution of academic rank among the respondents was slightly skewed toward the lower ranks, as compared with the university profile in 1981. The profile was as follows: 21.7% were full professors, 39.1% were associate professors, 30.1% were assistant professors, and 8.4% were instructors or lecturers at the time they received their grants. About 59% of recipients had been at the university for 10 or fewer years.

Respondents were asked to indicate the degree of influence (very, quite, moderately, somewhat or not influential) that various reasons had on their decision to apply for an instructional improvement grant. The most influential reasons were as follows:

Reasons for Applying	Per cent Indicating Very or Quite Influential
Desire to introduce changes in subject matter	64.4%
Desire to introduce changes in curriculum	59.8%
Desire to use newer technology	57.3%
Desire for personal development	52.0%

An open-ended inquiry asking respondents to name the most important objective of their grant elicited the following responses:

Objectives of Project	Per cent Indicating as First Choice
Course and curriculum design	42.0%
Develop curriculum materials	22.2%
Develop AV materials	14.8%

Various project outcomes were studied. About 87% of the faculty indicated they were still using the instructional approach developed through the grant. Almost two-thirds of the faculty (65.8%) reported that colleagues were using techniques or materials developed under the grant. In assessing spin-off outcomes of the grants, faculty cited the following:

-33.3% had published an article as a result of the project

-34.2% had attended one or more teaching improvement workshops

-82.3% had developed other teaching improvements

-89.6% reported increased motivation as teachers

-85.5% said that their teaching skills had improved

-77.5% considered their project a success

-80.0% deemed their project worth the effort invested

An additional 17.5% said "probably" on each of the last two items.

A statistical procedure was utilized to assess whether different kinds of projects had different patterns of outcomes. The following project groups were compared against all others for each outcome: labor intensive grants (more than $1,000 expended on faculty or other assistance), high cost grants (more than $3,000), and grants with significant equipment purchases (at least $450). No significant differences were found for grants in these categories as compared to all other grants.

Discussion

The findings of this study show that grant recipients were motivated by several factors, with considerable overlap of reasons for individual faculty. A majority of faculty wanted to change what they teach and how they teach it. Whereas 64% of the faculty wanted to introduce new subject matter, this inclination was augmented by technological and personal factors. These data suggest that faculty bring a pragmatic and comprehensive concept of educational change and are not driven by a single line of thought or by some envisioned panacea. In the light of these findings, it is not surprising that "hot" technologies such as the computer or television constitute important, but not preeminent, areas of initiative. While virtually every grant included the adoption of a technology, only a small proportion of the grants (about 15%) involved computers, television, photography, etc.

Although this study relied on self-reported data, the uniformity of the responses suggests that the grants program has indeed elicited many desirable outcomes. Faculty continue their project activities. Faculty go on to other teaching improvements. Faculty are more motivated to teach well. Faculty teaching skills improve. Faculty are satisfied with the outcomes and effort of their projects. It is important to note that these positive outcomes were recorded even when comparing grants of different cost, equipment investment and labor intensity. The pattern of responses suggests that the grant process was a crucial factor in eliciting productive faculty activities. When faculty define a problem of interest and develop a response--a technology--for addressing the problem, they are very capable of carrying the project to a successful conclusion.

A limitation of this study, as well as other examinations of faculty granting mechanisms (Davis, Abedor and Witt, 1976; Kozma, 1978; Davis, Strand, Alexander and Hussain, 1982), is the lack of objective measures of impact on student learning. Pending implementation of such costly and complex studies, one must rely on faculty self-reports. It is relevant to note that a tacit assumption underlying grant programs is that commitment to instructional improvement by intelligent and motivated faculty is likely to have a positive impact on student learning (Holmes, 1979). This stance is consistent with assumptions made by researchers such as Astin (1980), who argue that time on task by faculty and evaluation (e.g. the proposal review by the faculty committee) will enhance educational quality.

In summary, this study has documented the widespread adoption of new technologies by faculty. While only a small proportion of faculty adopted computers and video, the new methods have produced important positive outcomes. As such, these faculty have embarked on a change process that fits personal needs, integrates technologies in accordance with personal preferences and is likely to produce ongoing instructional initiatives. This is evidence that one should not be pessimistic about the willingness of faculty to adopt new technology. Faculty *will* take action, though conditioned by a critical eye and with a keen sensitivity to the particulars of their situation.

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DECISION-POINT FACULTY EVALUATION PLAN

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The effectiveness and efficiency of colleges are directly related to how well they utilize their resources. Faculty are the major human resource of colleges. Each faculty member at a college or university contributes his or her area of expertise to a specific and particular work role. To enhance the effectiveness and the efficiency of the college and to contribute to its vitality is to increase the effectiveness, the efficiency and the meaning of each work role. Faculty evaluation can help achieve this end; it can provide valuable strategic information for deciding how to maximize the human resources of the institution.

Popular college faculty evaluation plans, such as those developed by Miller (1974), Centra (1979), and Dressel (1976) place individual development as their foremost purpose and assume that the organization will benefit from such evaluation for development activities. Yet, evaluation plans themselves must be accountable; the merits of any evaluation plan must be judged in terms of the extent to which it improves the college.

Colleges today want to continue and improve services to students. They want to maximize the talents of their faculty and staff. They want to match those talents with their changing curriculum. They want to enrich faculty work roles so that students may be able to more fully utilize faculty abilities. They want to eliminate duplication of effort by staff and duplication of curriculum in the organization. They want to clarify responsibility, accountability, and authority. They can do all of this, better, as more precise ways of describing faculty behavior are developed.

Given these human resources planning needs in colleges, it is evident that there are specific questions which an evaluation plan should address:

1. Does the faculty member's performance in the work assigned meet minimum expectations?
2. How important are the faculty member's duties to the successful functioning of the organization?
3. How may enhancement of each faculty member's strengths relative to duties assigned be promoted, and how may an individual's weaknesses in assigned duties remediated?

Described below is a faculty evaluation model currently being piloted at Des Moines Area Community College (DMACC). The model addresses specifically each of the three decision-point questions. While these three strategic questions represent separate types of institutional decision-making, they are somewhat interrelated. They are interrelated because, after all, each individual must be viewed in terms of performance, their role within the organization and their contributions to the capacity of the organization. At the colleges today, evaluation is an ongoing process consisting of three systems each relating to one of the strategic questions (listed above). The systems are Performance Appraisal, Priority Appraisal, and Capacity Appraisal.

Performance Appraisal provides measureable and legally valid assessments of faculty performance. This system is simple, easy to implement, and recognizes the expertise for which the faculty member was employed, rather than limiting evaluation to generic abilities or out-of-context skills.

Priority Appraisal, provides information on departmental priorities and faculty abilities appropriate to needs. This second decision point addresses the need to identify and match faculty member talents with institutional priorities. When cuts in faculty need to be made, it becomes equally important to reassign load and duties of continuing faculty according to abilities. No matter how competent and effective an individual may be, if the area of their competence is no longer needed, then reassignment and retraining are needed. Such decisions require information different from the performance measures proposed in the first system. The information is not based on individual performance, but rather on clarity of institutional goals and the subsequent development of objectives by members of each unit within the organization.

The third faculty evaluation system is Capacity Appraisal. After determining if the faculty member is providing the expertise for which he/she was hired, and after determining if that expertise is central to the college mission, plans for enhancing the capabilities of that faculty member can begin. In previous research, Ratcliff (1977) discovered that while many faculty evaluation plans were nominally directed to faculty development, few faculty improvement plans used evaluation reports as criteria for the establishment of faculty development needs. The Capacity Appraisal system provides for the establishment of individual faculty improvement goals which are measurable, attainable, and directed to the accomplishment of a) institutional priorities, b) the growth of individual's capacity to contribute to the college, and c) the enhancement of organizational productivity.

The balance of this paper describes the first decision point, performance appraisal.

PERFORMANCE APPRAISAL

The purpose of the Performance Appraisal is to answer the question, "Does the faculty member's performance in the work assigned meet or exceed minimum levels of expectation?" The goal of Performance Appraisal is to identify the match or the gap between expected levels of performance and actual ones. Such gaps may be positive or negative; the worker may exceed, meet, or fall short of acceptable performance levels in the work assigned. Performance appraisal represents the supervisor's best judgment as to how well the individual fulfills the specified responsibilities of the position, and what possibilities the individual has for improvement and advancement. It describes the quantity, quality, timeliness and manner of performance necessary to accomplish satisfactorily the duties and responsibilities of the position. Performance appraisal establishes how the principal work activities should be accomplished, how much work must be done within a given amount of time and how well it must be done (Fortunato and Waddell, 1981).

Performance Appraisal is based on each individual's job description. It is only responsible to expect that an individual will be evaluated according to that person's job responsibilities. Consequently, the job description must be a valid and current description of duties assigned.

In order for the worker's job description to be an effective basis for Performance Appraisal, it must be carefully constructed and reviewed by the worker and the worker's supervisor(s). Since the job description is the statement of the contractual relationship between the faculty member and the organization, both the faculty member and the supervisor should be involved in the collaborative review of the job description.

Review of the Job Description.

Effective job descriptions stated in performance terms are essential to the success of the Performance Appraisal. Job descriptions that do not describe the observable behavior of the faculty member cannot provide a valid basis for Performance Appraisal. Job descriptions which specify observable outcomes provide concrete criteria for identifying the match or gap between expectations and performance.

Job descriptions also need to address the duties of the faculty member by specifically identifying (a) competent behavior in duties, (b) satisfactory completion of duties, (c) satisfactory effort in relation to assigned tasks, and (d) appropriate professional and moral conduct on the job. Thus, the Performance Appraisal begins with a review of the job description.

Does the job description accurately describe an individual's duties in outcome specific terms? Has the person's work role evolved to where old responsibilities need deletion and new responsibilities need description? What proportion of the faculty member's time need be devoted to each job duty? These questions are discussed as supervisor and supervisee mutually establish specific performance criteria reflecting desirable, achievable and measurable outcomes.

In the Performance Appraisal system at DMACC, the process of reviewing the job description for most faculty members, is merely a task of discussing, editing or updating their present job description. The process provides an opportunity for meaningful dialogue between the supervisor and the faculty member at which time specific duties and expectations related to those duties are discussed.

Once job descriptions and performance standards have been established, the administrator or supervisor can evaluate work performance by deciding whether the criteria were met, not met, or exceeded. If the faculty member did not meet the minimum criteria, the supervisor must ask ... "What training is needed to improve performance?" ... What resources are needed to assist this individual?" If the faculty member exceeded the criteria, the supervisor must ask "... What additional action can be taken to reward this demonstration of excellence?" For every faculty member at DMACC each supervisor will assess strengths and weaknesses relative to assigned duties. From that assessment the supervisor will consider what kind of leadership and direction might best help the faculty member.

Who Conducts the Performance Appraisal

The Performance Appraisal of a DMACC faculty member is conducted by the supervisor of that faculty member. Because of the daily formal and informal contact of the supervisor with the faculty member, the supervisor is responsible for the Performance Appraisal evaluation of the faculty member; it is part of the supervisor's duties and competencies. If a faculty member reports to two or more supervisors on the administrative grid, undifferentiated job responsibilities will be appraised collaboratively by both supervisors. If job responsibilities (according to the job description) require that the faculty member report to one supervisor for one set of tasks, and another supervisor for another set, the Performance Appraisal for the first set of duties will be conducted by the first supervisor, the second set by the second supervisor, and those responsibilities for which the faculty member reports to both both supervisors will collaborate on the Performance Appraisal.

The Performance Appraisal Process

The process of evaluation for the Performance Appraisal begins near the end of an academic year with a review of the faculty member's job description. Supervisor and faculty member confer on the goals of the college and the college unit, and on the tasks to be accomplished in the work assignment. The college environment is constantly changing in response to community needs, and therefore this annual review and updating of faculty contributions to the college is essential to maintaining and enhancing college vitality and viability. The revision of the job description takes place prior to the beginning of the academic year, is signed by the supervisor(s) and the faculty member involved, and copies are placed with the faculty member, the supervisor(s), and the central personnel file.

The outcome of the supervisor/faculty member conference is a revision of the faculty member's job description. The revised job description should always describe, in terms of demonstratable behavior, the acceptable levels and kinds of work performance relative to the duties of the position. All job descriptions should state acceptable levels of performance for each duty. All job descriptions should state each duty as observable and measurable behavior.

The revised job description is designed to provide criteria for the measurement of faculty member performance relative to competence. Twice a year faculty members not on continuous contract meet with their supervisors to complete the Performance Appraisal. In conference with the faculty member, the supervisor(s) rate the level of performance of the faculty member for each duty listed on the job description. Areas where performance has excelled far beyond acceptable levels are noted, as are areas where performance is below acceptable levels. Both excellence and unacceptable performance are extreme cases requiring further institution action (reward or remediation). Both require documentation of the behavior so cited. Copies of the completed Performance Appraisal are signed by the supervisor(s) and the faculty member involved and are placed with the faculty member, with the supervisor(s), and in the central personnel file.

If inadequate performance in one or more job responsibilities is indicated in the Performance Appraisal, then the following must also be established by supervisor and faculty member in conference: First, the specific knowledge, skills, abilities, or attitudes need to be identified which will remedy the deficiency. Secondly, a reasonable time period needs to be established in which the remediation will be accomplished. Thirdly, monthly dates within the remediation period need to be established when the supervisor and faculty member will meet to check on the faculty member's progress toward remedying the identified deficiency. Lastly, the resources (time, money, materials) needed to effect the remedy need to be established. The supervisor will indicate the proportion of those resources to be contributed by the college; the remaining resources will be responsibility of the faculty member. Failure to remediate deficiencies in performance established the the faculty member's job description is cause for termination or non-retention.

The Decision-Point Faculty Evaluation Plan provides comprehensive information about faculty performance, faculty capabilities useful in the major areas of college decision-making . The plan evaluates faculty performance relative to their work role, relative to institutional needs, and relative to their own aspirations for betterment of the college and of themselves.

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IS OUR IUT REALLY NECESSARY (OR USEFUL, OR EFFECTIVE................?).

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Introduction

Whenever the topic of quality of teaching in British universities has been raised, the associated problem of how it can be acceptably evaluated has tended to result in a total lack of generally acceptable factual evidence. This problem has still not been solved.

A variety of indirect and direct methods has been used. One supposedly common method is the delicate questioning of colleagues of the person being investigated, over a glass of dry sherry in the Senior Common Room. Perhaps of greater reliability is to find out how effectively a particular lecturer's students learn, especially in view of the expressed opinion (Ramsden, 1980) that evaluation of students measures aspects of teaching rather than of learning. More directly, student opinion is sought. Many objections have been raised to this, some of the more valid being that the students have only experienced a limited range of lecturers, that each student establishes his or her own standard, and that this standard may differ for every student. Rhodes (Rhodes and Rumery, 1980) has also shown that the student report/evaluation forms used when evaluating lecturers' performances are themselves a significant variable affecting the manner in which lecturer performance is described and judged. A more detailed consideration of student evaluations can be found in Warga's paper to IUT '83 (Warga, 1983).

All of these methods are subjective: this is reasonable, given that there can be no absolute and objective definition of how good a lecturer is while the situation exists that some students can find a lecture very clear but other students can find the same lecture completely obscure (see, e.g. Laurillard 1979).

Despite the problems [illegible] the comments that students make may be very pertinent. [illegible] to be dismissed with rationalizations such as "The students [illegible] judgement on what they think they want, but I am in a much better [illegible] know what they need."

Training University Teachers

Even so, student opinion became so strong in the later '60's that it resulted in an official recognition of the need to encourage good teaching in British universities, manifested by the setting up of the Coordinating Committee for the Training of University Teachers (CCTUT).

This lived through the 1970's, but despite its enthusiastic leadership, and support from within the universities, its change in the 1980's from an active to a passive role emasculated it. This has been documented previously for IUT (Matheson, 1981) and is not the concern of this paper; it is the effects resulting from the Coordinating Committee's existence which is being considered. Was it a large stone dropped into a pool of university complacency, causing waves which spread throughout the system? Or did it merely cause ripples which died down before they spread to where change was needed?

There is no convenient and direct method of making such an evaluation, so several indirect indicators have been taken. The value and validity of each alone varies, but together they reinforce each other;;they give a broad picture of the attitude to, and effects of, attempting to improve the teaching which goes on in British universities generally, and in one particular university.

Opinions from new undergraduates.

Many teachers in both primary and secondary education, (more particularly the latter) pass through universities as undergraduates and/or while taking their post-graduate certificates of education. The types of teaching method to which they are exposed at university are not necessarily those which they will use for their own teaching, but these teachers act also as sources of information about universities for their students; as such, the opinions and guidance they give will inevitably be coloured by their own experiences while at university. This approach as a guide to teaching in universities is obviously of limited value. There will only be a limited number of teachers within the schools who would have been trained within the last ten years, so they would not form a large proportion of the total teaching staff of schools; not all teachers study or train at universities (but those that do are more likely to be teaching the upper secondary age ranges) and the assumption is being made that exposure to a wider range of teaching methods at university is indicative at least of an interest in, and an effort to provide, better teaching by the university, though it does not follow that the teaching actually is better.

As part of an induction programme, new undergraduates on their first day at university were given a list of teaching methods and asked to select from them

(a) those teaching methods of which they had experience;

(b) the three teaching methods which best helped their learning;

(c) the three teaching methods they expected to encounter most frequently at university.

These were put to three separate groups of students, encompassing all the undergraduate disciplines taught in the university, and answers were received from 287 students.

The teaching methods found to have been most commonly used with these students were (in descending order) written assignments, personal reading and directed reading; least common were individualised learning, and seminars. Though about 2/3 of those responding were familiar with lecturing as

The following term a programme was set up incorporating some of the most "popular" topics. Again, copies were sent to all "interested" people, asking who would come, and 13 replies were received: 4 of these were from persons who had completed the original questionnaire.

The implication would seem to be that the general matter of improving university teaching is only peripheral to the interests of most of the staff. They are not opposed to it, but insufficiently interested to give any priority to it or to information on it - the latter is only on one of the many pieces of paper which staff receive, even in a small university. How easy it is to intend to complete it later, only for it to be buried under newer duplicated sheets.

Some encouragement can be obtained from a consideration of those who, as new members of staff, attended one of the annual induction courses. Of those who came to one of the last seven courses, and are still at the university, 25% responded to the questionnaire (as against 6.8% for the university as a whole) and over 50% have been to at least one of the staff development events put on during the past year.

Student Surveys

This problem of good and bad teaching is also being tackled by the consumers in many universities. The Students' Union at The City University has recently surveyed student opinion in all departments of the university on various aspects of lecturer/student contact, finding out for each department

(a) "The percentage of lecturers that are thought to give a well planned lecture".

(b) "The percentage of lecturers that communicate effectively".

(c) "The percentage of lecturers that display enthusiasm and an interest in students".

and (d) " The percentage of lecturers that are felt to be easily available outside timetabled periods", a teaching method, it was not highly regarded for learning purposes - small group tutorials, personal reading, and written assignments were thought best for learning. Despite this, lectures were anticipated by everybody as being far and away the teaching method they were most likely to encounter as undergraduates. Small group tutorials in second place were followed (a long way behind) by personal reading, written assignments and direct reading. Though few people knew of teaching methods such as projects, film and video, individualised learning, or peer teaching, those that did were not anticipating these methods to feature in the repetoire of lecturers.

Staff attitudes.

Students' expectations tend to become self-fulfilling prophesies: beacuse there is no need for lecturers to do other than lecture on the courses they run, few variations in teaching methods appear. New methods would need, initially at least, more preparation time, and the situation still holds where little or no credit is given for good teaching (to some extent because it cannot be defined and evaluated, which is where this paper started).

This is not intended to imply that research is all, and that students' needs are totally ignored: most staff care about their students, and many lecturers give good lectures, but too many are mediocre, some downright bad, and teaching methods other than lectures, tutorials and practical classes, are rarely used. There is room for improvement, there is opportunity for improvement, but there is little action taken for making that improvement.

This is shown by the lack of interest in taking up the possibility of staff development/training. In order to find out what might interest staff, a brief questionnaire was sent out giving a list of 20 possible topics, and with spaces available for further topic suggestions. Approximately 400 were sent out, and 27 returned: only 3 persons had their own proposals for topics.

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i.e. all factors which concern teaching/learning rather than administration or research (Beacon, 1982,1983).

Within (a), departmental results varied from all lecturers (100%) down to 47% but the communication skills (b) ranged from 98-35%, and the enthusiasm shown ranged even further, from 100 - 28%; the decline continued in availability, (d), being between 98 and 21%.

There is no absolute basis for these evaluations, and most depend on comparison between different lecturers taking a student, so that relative evaluations may differ. There has also been disagreement, eg an ex-student wrote that "one of the lecturers was so bad that ....many people only ever turned up to her lectures by accident". (the lecturer being in the department with the 98/100% ratings).

It is, though, one of the few items of direct rather than indirect information available about teaching quality in the university.

Conclusion

As previously indicated, the range of evidence available varies from weak and indirect to very strong and direct, but it all points to the same conclusion - that too much of the teaching in universities is unsatisfactory and is still in the mediaeval tradition of transmitting information by lecturing.

It is much easier to point out defects than to remedy them, but if an officially backed and sponsored body such as CCTUT has failed to have any noticeable lasting effect, it is going to be very difficult for the separate uncoordinated programmes in each university to have any revolutionary impact. The principal way would seem to be dependent, as before, on pressure being brought to bear by student bodies, aided by a greater recognition of good teaching as being a desirable reward-worthy attribute in lecturers.

Until then, events such as IUT tend to be occasions when those already interested in better teaching - who may not be good teachers, but who are at least trying - meet to exchange ideas. How do we get those ideas to those who never attend anything to do with teaching improvement?

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THE STUDY HABITS OF STUDENTS TAKING A COURSE USING A PERSONALISED SYSTEM OF INSTRUCTIONS

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The Course

The course concerned was an option course in Physical Metallurgy for 2nd year Chemistry students. It was run as a personalised system of instruction (PSI) over three years. The course was run on the basis proposed by Keller(1), using a course book and practical work, but with no additional lectures.

Each student was provided with a course book, together with a study guide for the first unit, which included objectives of the unit, appropriate problems and suggestions as to how the course material might be used. All students were told that they could present themselves for unit tests when they felt ready to take them. On satisfactory completion of a test, the students were given a study guide for the following unit. The test sessions were also used for individual tutorial work for students who were having difficulty with a particular unit, or for tutorial guidance based on the evidence of a unit test. The test papers were returned to the students, together with comments designed to encourage further individual investigations when they next presented themselves for a test.

A final date for taking unit tests was set and at the end of the appointed time the students were provided with study guides for the units which they had completed. All students had to take an examination of the traditional limited time, unseen type in June following the course. During 1978 and '79 the course consisted of nine units, but in the light of student comments and student progress through the course, it was decided that the 1980 course should contain only eight units.

The Students

The students were in their second year of study in the Chemistry Department and could select this course as an option. The normal method of teaching in the department was lecture based and none of the students had undertaken a PSI type of course previously. Information given to the students indicated that the Physical Metallurgy option involved independent study rather than lectures.

The students had already been classifed as Honours or Ordinary candidates by the Chemistry Department. The classification into the Ordinary course was based either on GCE 'A' Level performance on entry to the department, or on performance at the end of the first year of the course. The Honours candidates had to select three options from thirteen, and the Ordinary candidates could choose two options from eight. The number of students taking the Physical Metallurgy PSI course is given in Table 1.

Table 1 - No. of students taking the course

	Honours	Ordinary
Year 1	7	1
Year 2	9	4
Year 3	13	9

Experiences of running the course

During the first two years of running the course, it was possible to detect a marked difference in the performance of the two groups of students (Honours and Ordinary) as classified by the Chemistry department. The two main measures of student performance on the course were (i) the number of course unit tests satisfactorily completed by the student in the allocated time and, (ii) the end of year examination results.

Table 2 - Average no. of unit tests completed

	Honours	Ordinary
Year 1	5.8	2.0
Year 2	6.1	2.5
Year 3	6.2	2.6

Table 3 - Average examination marks

	Honours	Ordinary
Year 1	55.1	34.0
Year 2	47.3	33.0
Year 3	50.0	30.2

Average mark for all options

Year 1	56.3	45.8
Year 2	48.2	44.8
Year 3	52.1	40.4

From table 2 it can be seen that the Honous students completed a larger proportion of the course and during these two years none of the Ordinary degree students went beyond unit 4 of the 9 unit course. There was a marked difference in the examination performance of the two groups, when compared with the performance of the similar groups on other option courses. The Honours group on this course performed close to the average value for other options, whereas the Ordinary group of students on this option, produced an average mark over 30% lower than the mark for Ordinary students on all options.

This evidence indicated that this type of course may not be good for the Ordinary students, but did not indicate why this was so.

Study survey of Year 3 students

During Year 3, on the evidence of feedback from students, it was decided to delete the first unit of the course and reduce the course to 8 units. In order to establish the use made by students of the provided materials, a questionnaire was sent to all students (after the date for final completion of the unit tests), asking for details of their work on the course.

Student progress during the course period was better in Year 3 than in the previous years and is shown in Table 4. This table showns that although the proportion completing the course was higher for both groups, there was still a difference in progress between the Honours classified students and the Ordinary students.

Table 4 - Student progress through the course Year 3

	Honours	Ordinary	Total
Ave. no. of units completed	6.7	4.4	5.8
No. completing all units	8 (61.5%)	3 (33.3%)	11 (50.0%)
No. completing 7 units	4 (30.8%)	1 (11.1%)	5 (22.7%)
No. completing less than 2 units	1 (7.7%)	3 (33.3%)	4 (18.2%)

Table 5 - Questionnaire responses

	Honours		Ordinary		Total	
Ave. no. of hours per week spent on the course	6.7		4.4		5.8	
	Yes	No	Yes	No	Yes	No
Study guide was useful	8	1	4	1	12	2
Student made his/her own notes	5	4	1	4	6	8
Sample questions looked at	8	1	2	3	10	4
Sample questions attempted	2	7	0	5	2	12
The unit test were fair	9	0	3	2	12	2
The test/tutorial sessions were useful	8	1	4	1	12	2
Student looked at comments on completed test papers	9	0	5	0	14	0
Student learned something from the laboratory classes	8	1	3	2	11	3
Student worked alone	7	2	5	0	12	2

There were still some students, who clearly did not like this approach, or who were not prepared to work in this manner, and one third of the Ordinary students did not complete more than one unit. Over 90% of Honours students completed 7 or 8 units whilst only 44.4% of the Ordinary students did so.

The response to the questionnaire produced fourteen replies, corresponding to a 63.6% response rate. There were nine replies from Honours students (69.2%) and five replies from Ordinary course students (55.5%). Unfortunately none of the Ordinary classified students, who completed less than two units responded to the questionnaire. Questionnaire responses are summarised in Table 5.

There was a difference in the amount of time per week spent on the course by the Honours and the Ordinary groups of students. The figure for the Ordinary classified students would presumably have been lower, had there been responses from the three students who only carried out a small portion of the course. The majority of students in both categories found that the study guides were useful, though two students felt that this was not the case.

It was suggested that the students should make their own notes from the set text book, highlighting the main points to them, with a view to using their own notes for examination revision purposes. There appeared to be a marked difference in practice in this respect between the Honours students and the Ordinary students, with 55.5% of the Honours respondents making notes and only 20% of the Ordinary respondents making notes. The study guides included a number of appropriate questions at the end of the chapters in the set text book, that the students ought to be able to do, after having successfully completing the unit. These questions were of the type that had appeared on examination papers of various bodies. Most of the respondents had looked at the questions, but only two of the fourteen had actually attempted any of the questions and both these students were in the Honours group.

Test sessions were found to be useful by most respondents. The one Honours student who made a negative response, only attempted one unit test and, therefore, the response is based on one single test session. The comments on the students' completed test papers were studied by all the students. Most of the students felt they had learned something in the associated laboratory classes, though these were only a small portion of the course, on two afternoons near the end of the course completion period. Most of the students worked alone on this course, with just two of the Honours students claiming that they worked together for some of the time on the course, so that for most of the students it was an independent learning process, rather than a co-operative process.

The student comments on the questionnaire were added to comments made by students immediately on ending the course, and it was particularly interesting to note the individual difference of response of the students to some aspects of the course. The Honours student who only completed one unit, commented on the questionnaire, "the text book, which this course is solely dependent upon, was written, (it seems to me), tediously and without much afterthought for the student. A better book, or a more varied selection should be found". This compares with another student who completed the course stating, "the book is easy to read and the diagrams very helpful", another Honours student, "the book is generally good and explains things very understandably" and an Ordinary student, "the text book used was good, because it was fairly straightforward and concentrated on the major points, with good, clear, easy to follow illustrations". All these last three students completed the course, suggesting that the attitude of the student towards the style and presentation of the course text on this type of course, can have a significant influence on the students attitude, and hence, performance on the course.

It was interesting to note that a number of students suggested that additional lectures may have been useful, since these were part of Keller's original proposals for a course of this type.

Typical comments were, "could be supplemented by one or two lectures, dealing with fundamental points", "a little difficult to follow, and I feel that some lectures are required to help understanding", "I could do with a couple of lectures on the more difficult topics". These comments were made in spite of comments by some students about time required to learn in this way. "I thought the course required too much time because I find it difficult to pick up facts by just reading them", "the course needed considerable hard work to be completed", were comments made by students, which related to the high work load placed on the students by their studies in their own department and may explain, to some extent, the reluctance of the Ordinary students to spend a lot of time on this course.

Individual students made comments which reflected on their studying pattern, such as, "I tended to spend a long time making notes", and, "I enjoyed the course although it took a great deal of willpower to sit down and make notes on the text. I think I would have benefitted from a set test timetable e.g. every Wednesday, instead of when it suited me", "I think I prefer to have lectures instead of having to read the book by myself. The tests do make me learn some of the work, but I found I had difficulty in relating one unit's work to another", "the course enabled a lot of material to be covered in a short time and allowed me to find out about a completely different aspect of 'Chemistry'".

Discussion

The findings in this paper appear to conflict with findings of some other workers in particular aspects, whilst agreeing in other aspects.

Kulik, Kulik and Carrmichael(2) in their survey on work of this type of course, reported that generally the students felt that they spent more time on such a course, though it was not clear whether the time difference was significant. They suggested that the added concentration required for such a course may cause students to feel that this is so. Boud, Bridge and Willoughby(3) comment on the importance of the 'learning milieu' and these workers supported general trends shown in this investigation in which the students did not state that the course involved them in a lot of work, possibly more than they would like in an already overcrowded course. Boud et al indicated that there was little evidence of the effects of the mode of introduction of such a course on course performance. This investigation indicated that, for one student at least, the introduction of a course book that was considered unsuitable had a serious effect on the student's performance.

Duchastel and Whitehead(4) in their investigation on Open University students' reactions to inserted questions in textual material indicated that exercises in a particular unit were done by 90% of the students and self-assessment questions by 85%. They suggested that a good number of students valued questions for the purpose of assisting them for reviewing the units and for self-assessment purposes. The work carried out with students who were used to working independently from textual material and the findings are in complete contrast to the students in this investigation, in which less than 20% of the students attempted any of the sample questions.

Horsey and Milson(5) in their investigation on an individualised learning scheme, suggested that although the overall relationship between study habits and performance on the scheme was not evident, there were study habits which may be associated with relatively good performance. These were some organised, disciplined use of study time and more than one reading of the unit, with a separate reading a few days apart. They suggested that many students could have improved their performance if they had so desired, and indicated that, assistance which could be offered to help improve students' performance would be in the areas of, (a) stressing the importance of the topic in the student's careers and, (b) guidance on effective study of the unit. They reported that this was attempted by means of a brief handout, outlining the course and describing how to work through it. They found that 95% of the students interviewed had forgotten its contents, and most had not read it. Students in their study had rarely used the list of learning objectives provided with each unit.

This is not in agreement with the present study, in which over 80% of the students claimed that the study guide was useful. Horsey and Milson suggested that poor study habits were a major cause of poor performance, rather than the learning method itself, and that attitudes to the subject and consequent alienation from the subject could be identified as the cause of poor performance in some students. This could well be the case in the present study. It is possible that the classification of students into Honours and Ordinary is at least partially a measure of student ability to work and organise work.

On this course, teaching within the classroom, as seen by the reaction to the test/tutorial sessions, seems to be satisfactory. The present course is capable of completion bymost students. However, there is a difference in learning outside the classroom between students on this type of course. The amount of time spent on the course varies, and practices in student note taking vary. With respect to note taking and attempting sample questions, is the suggestion that students on this type of course should follow such practices sensible or justifiable within the learning milieu? What can be done for students who find the course textual material unacceptable? Would it lead to improvement if students were recommended to work co-operatively on such courses? How does work on this type of course affect study of other courses?

These questions require further investigation before they can be satisfactorily answered.

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A CASE STUDY OF LATENT-IMAGE AND COMPUTER-ASSISTED STUDENT FEEDBACK MECHANISMS

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As part of the Medical School course, Mechanisms of Physiology and Pharmacology, approximately 100 multiple-choice questions, which reflected lecture material and were similar to questions found on the mid-term and final exams, were made available to students for self evaluation of progress. The questions, which were prepared by faculty of the Hubio 412 Course Committee, contained feedback information as to why each multiple-choice answer option was correct or incorrect. In cooperation with the University of Washington Independent Study Program (WISP) and the Office of Research in Medical Education (ORME), the study questions were prepared for use in latent-image and computer-assisted modes. An informal experiment was then carried out to ascertain student reaction to the self-evaluation questions and the two alternative feedback modes.

Research Design

To give students the opportunity to try both self-evaluation modes and to measure overall student reaction toward, and utilization of, each mode, the following procedure was followed:

1. The class was divided into two groups.
2. For the first two weeks of the course, one group had available the computer-assisted (CAE) mode of self evaluation while the other group used the latent-image mode. For weeks three and four, the groups switched modes of self evaluation.

3. Students were strongly urged to try the self-evaluation mode scheduled for them, but were fully advised that all participation was optional. The exercises were first and foremost a study resource. Thus, students could request the alternate mode from the one scheduled or not utilize the exercises at all.
4. Documentation of student reaction to, and utilization of, each mode was solicited via questionnaires handed out after weeks two and four. (There will be a handout outlining the experiment to students.)

Results

The voluntary nature of the experiment and the opportunity which students had to cross over to the alternate mode hampered gathering of complete and non-contaminated data on student reaction to these self-evaluation exercises. The questionnaire return rate is presented below as Table 1.

TABLE 1

Return rate for Questionnaires filled out at the end of weeks two and four.

Mode Scheduled	Week Two		Week Four		TOTALS	
	#	%	#	%	#	%
CAE	24/39	62	14/39	36	38/78	49
Latent Image	19/39	49	32/39	82	51/78	65
Totals	43/78	55	46/78	59	89/156	57

The total questionnaire response rates of 55% (Week 2), 59% (Week 4) and 57% (Overall) represents satisfactory return rates, but were lower than expected for questionnaires handed out in class. It is possible that those not returning questionnaires were students who opted not to use the self-evaluation materials. Results of the study, then, must be viewed as representing the views of those who responded and not those of the total class.

As a first step in evaluating the relative acceptance of each feedback mode, the questionnaire response rates for students assigned each mode were compared. Referring to Table 1, it is apparent that overall more students returned questionnaires when scheduled for the CAE mode (65% vs. 49%). However, two factors should be noted. First, during weeks one and two, a greater percentage of CAE-scheduled students returned questionnaires (62% vs. 49%) but during weeks three and four, this situation was very much reversed (36% CAE vs. 82% latent image). Second, the average return rate for Group I was much greater than was the return rate for Group II regardless of mode (72% vs. 42%).

Since students were randomly assigned to groups, the discrepancy in group response rates is surprising. An explanation may be hypothesized, however. Students assigned to the CAE were required to make appointments for using the computer terminals. Thus, active participation was involved early in the quarter before studies became overwhelming. During the first two weeks, 26 of the 39 CAE-assigned students called for terminal appointments. Twenty-four turned in questionnaires.

On the other hand, the latent-image-assigned students received [illegible] exercises in class with no additional stimulus.

Quite possibly, many from this group had not yet tried the latent image by the time the first questionnaire was filled out. (Only 19 of 39 returned questionnaires.)

When the two groups switched modes, the already more actively involved Group I students were assigned the more readily available latent-image mode at the very time that the quarter was becoming busier. In contrast, the less actively involved Group II students were assigned the more demanding CAE mode. The result was that few Group II students called for appointments (11 of 39) and only 14 of 39 returned questionnaires. Group I students, having cooperated during weeks one and two, continued to do so during weeks three and four.

It is also possible that during weeks three and four, students chose to cross over from the CAE to the latent-image mode. Some of these "cross-over students" may have called themselves "latent-image students" and thus inflated the response rate for that category.

Following is an item-by-item analysis of questionnaire results.

Question I,1. Number of available self-evaluation questions answered by students: Almost without exception, students returning questionnaires completed all the questions available to them regardless of scheduled mode.

Question I,2. Reasons for not completing all questions: A null question given the response to Question I,1 above.

Question I,3. Time spent on self-evaluation questions: Average time spent by students learning to use the scheduled mode and answering self-evaluation questions is reported below as Table 2. As expected, students took slightly longer to learn the mechanics of CAE usage.

However, students took slightly less time answering questions under the CAE mode than under the latent-image mode (approximately 40 minutes vs. 50 minutes). This time differential was not too surprising since students signed up for one hour on the CAE. Such scheduling would tend to hurry responses more than with the self-paced latent-image mode.

TABLE 2

Average Time Spent on the Self-Evaluation Questions for the Two Alternative Modes

Mode Scheduled	Learning the Mode Minutes	Answering Questions Minutes
CAE:		
Week 2	8	42
Week 4	6	38
Latent-Image:		
Week 2	4	45
Week 4	1	54

Question I,4. Requests for Alternate Mode: Approximately 10% of the students reported requesting the alternate mode from the one scheduled. The reported crossover was two-way, i.e., five students in each direction.

Question I,5. Acceptability of scheduled mode for future self-evaluation: Except for five students (3 CAE, 2 latent-image), the respondents found the mode scheduled them acceptable for further self-evaluation exercises.

Question II. What students liked about their scheduled mode: A summary of what students liked about their self-evaluation experience falls into the categories of "likes independent of mode" and "likes specific to one of the two modes." Most comments concerned the former category. Typical of these general comments were: "enjoyed receiving immediate feedback", "great having a yardstick to see what I do and do not know." Typical of comments specific to one mode were: CAE -- "fun"; "more like a test situation"; "the 'more' option is good." Latent-image -- "can be done at your leisure"; "less pressured."

Question III. Problems encountered with scheduled mode: Problems encountered were directly related to inherent weaknesses in the two modes. Thus, for the latent-image mode, the complaints were that the writing faded or was illegible; the pen broke or was lost; and that it took too much time to uncover feedback answers. For the CAE mode, students complained of the noise level; of 'logging-in' difficulties; of difficulty 'relating' to a machine; of the computer system 'crashing'; and of lack of portability.

It should be noted that the number of complaints was quite small.

Question IV. Evaluation of scheduled mode: Overall, students gave very positive evaluations to their experiences. About 50% of the respondents rated the exercises as an "extremely valuable experience." No one checked the "not worth the effort" category. In each case the ratings for latent image were slightly more favorable than for the CAE. The four questionnaire evaluation categories of Question IV were calculated. These data are presented as Table 3 below.

TABLE 3

Mean Student Ratings* of the Self-Evaluation Exercises

Mode	Week 2 Rating	Week 4 Rating
Latent-Image	3.3	3.4
CAE	3.1	3.1

*Ratings were on a scale of 1 to 4 points, 4 being the highest rating

Questions VI and VII. Preference between modes: When asked to state a preference between latent-image and CAE modes, by far the majority indicated a preference for latent-image although a few staunch computer converts were made (5-8 students). If but one mode were to be made available, 37 of 46 students would prefer that mode to be latent-image, 5 would prefer CAE, and 4 were undecided.

Reasons given for their preferences were as follows: Prefer latent-image--"no pressure"; "no hassle or problems of scheduling"; "can do at leisure"; "cheaper"; "all options can be erased"; "feedback is easier to obtain"; "fewer mechanical problems"; and "no waiting at terminals." Prefer CAE--"fun"; "easier to read"; "provides a more test-like atmosphere"; "the 'more' option for obtaining additional feedback."

Questions VIII - X. Quantity and quality of feedback: These questions produced little information of value (they were poorly worded). Apparently, students found no major problems with the amount or quality of feedback or with the procedures for obtaining that feedback.

Questions V and XI. Recommendations for improvement: The most common recommendations for improvement were to free the questions from errors of content and language; to make available more questions; to make questions more difficult; and to put the feedback on a handout sheet (not latent image).

Summary

In summary, it is very apparent that students who responded (approximately 60% of the class) enjoyed these self-evaluation exercises and found them a valuable learning experience--regardless of mode assigned. Given a preference, most students would choose a latent-image format to a computerized format for these study questions. However, students indicated that either mode was acceptable for future self-evaluation exercises.

As a final remark, it is only fair to note that these exercises did not draw upon the more powerful capabilities of the computer as a self-evaluation alternative. Therefore, conclusions regarding use of the computer for student self-evaluation should be restricted to this particular type of situation or to very similar situations.

COMPUTER-MANAGED INSTRUCTION AT UNIVERSITY LEVEL

A CASE STUDY

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Introduction

As the use of computers as educational tools at all levels of instruction increases, the question that will arise with increasing frequency is not *whether* the technology should be applied, but *how best* to apply it to a given instructional environment. Computer Based Education (CBE) can be envisaged as embracing two complementary subsets, frequently termed "Computer Assisted Instruction" (CAI) and "Computer Managed Instruction" (CMI) (1). Broadly speaking, CAI concerns itself with the presentation of educational material such as lessons, drill and practice exercises, laboratory simulations, and instructional games, whereas CMI presents testing episodes, diagnoses deficiencies, prescribes remedial material (such as, but not restricted to, CAI) and keeps record of the whole process. It is important to bear in mind that the various functions of CMI should work in concert and be aimed at the optimization of individualized instruction.

The general strategy of CMI on which the present report is based is as follows: a student is tested on a particular set of objectives. Failure to master one or more objectives will refer the student to the optimal mix of learning resources selected for each objective. Following exposure to the learning resource, the student is re-tested, and if successful, will move on to the next molecular set of objectives. Failure causes the loop to be repeated.

The University of the Western Cape committed itself to large-scale implementation of CBE, when, after a trial period lasting about a year, it installed its own 64-terminal PLATO system. The PLATO system has, apart from a huge library of CAI material, a software package termed

"PLATO Learning Management" (PLM), which enables large scale implementation of highly sophisticated CMI without any requirement for programming by users. It is thus particularly well suited to the use of faculty members who wish to apply CMI in their field with a minimum of effort. This presentation describes the use of PLM at second-year university level in Biochemistry at the University of the Western Cape.

The PLM system:

The core of the PLM system is the "PLM-module", where authors input questions which test a student's mastery of clearly stated instructional objectives (2). Up to 30 such objectives (with a combined total of 1800 questions) may be entered for each module. There are 6 different question types: true/false, matching items, multiple-choice, questions requiring the recognition of touch-sensitive areas of the screen, numerical problems, and questions requiring the input of short answers. It is at the level of objective formulation and question design that the PLM author is most extensively occupied, and thus makes best use of the expertise in his subject.

Prior to the testing episode, the student may, at the author's option, be directed to an introductory CAI lesson, and, after succesful completion of the module, an additional "reinforcement" CAI lesson may be prescribed.

A number of modules (a maximum of 28) may be grouped to form a "course", and a number of such courses (up to a maximum of 15) constitute the so-called "curriculum".

Coupled to each PLM-module is an inventory of "learning resources" which cover the various instructional objectives of the module. These learning resources may cover a large spectrum of didactic approaches, and they are in no way confined to CAI material. Ideally, as many different teaching media as possible should be entered as learning resources, in order to allow the student latitude in the choice of medium, but naturally, one will be severely limited by whatever is available. It should be noted that PLM offers the instructor the opportunity to move directly into CBE even if there is no CAI material available in his field.

The PLM system offers a rich variety of options as to how the students may gain access to the testing material, and in addition, has a very extensive record-keeping ability, enabling the instructor to check the progress of the class as a whole, or its individual students. Students in their turn are made aware of those areas of the subject in which they are experiencing difficulties and are directed by a well-structured study program. Contact between instructor and student is facilitated and encouraged by message-writing capabilities on both sides.

Implementation:

For a number of years, the first, introductory course in Biochemistry was offered in a traditional way: there were 5 40-minute lectures and one laboratory session per week. The students attending the course are second-year students who can be divided into two groups, Pharmacy majors, who have need of the course as a prerequisite to Pharmaceutical Chemistry, and Science majors who may elect to take a final (third-year level) course in Biochemistry as one of their two major subjects. This heterogeneity of students pose a barrier to serious innovations as the motivation of many of the students for the subject is low. Attempts to reduce the number of lectures and introduce problem-solving sessions and discussions did not result in motivating students to self-study. On the contrary, participation by the students was desultory and absenteeism during those sessions was high! In 1981, it came to light that not one student had purchased the recommended textbook, total reliance on class handouts and lecture notes being the order of the day. In this climate, "cramming" for tests and examinations is the highest level of intellectual activity, and the typical question asked of the lecturer would more likely as not be a question gleaned from an old examination paper.

The reasons for these somewhat negative student attitudes are complex, and are rooted in the fact that the University of the Western Cape serves a socio-economically disadvantaged student population, most of them first-generation university students, arising from a community with little tradition of schclarship. On the other hand, our students have been quick to make use of CAI, and exposure to the medium in 1980 and 1981 showed that the time was ripe for large scale innovation having CMI as its underlying strategy. What became clear from our preliminary use of CAI, is that initial motivation to use the system was high, but comparatively few students made sustained, voluntary use of it. The reason for this is almost certainly the fact that use of CAI was considered by the lecturer as supplementary to the normal work of the class, and that the students did not grasp its relevance to what *they* discerned as educational objective, namely the passing of conventional examinations.

From this, and from what transpired with implementation of CMI in 1982, the author draws the conclusion that CBE, to be most effective, must be the agent of innovation at University level and not simply an adjunct to traditional instruction. Thus, at the start of the 1982 academic year, students were informed that the course would be run in a totally new way, with the computer managing the whole instructional process, with the lecturer giving up his traditional role, instead to be considered as one of the many sources of information to which they would have access. Formal class tests would be run on the PLATO system, and a suggested level of on-line activity set at 3 hr per week. Three scheduled lectures per week would be cancelled, and formal class contact limited to two 40-minute sessions per week.

The subject matter was divided into eleven PLM courses, each of which was made up of various numbers of modules. The number of modules in a given course does not reflect the relative importance of a particular course, but represents natural sub-divisions of the subject matter and the availability of CAI material in the PLATO library suitable as introductory or reinforcement lessons. Exposure of the students was strictly linear, in that access to a module was only allowed following mastery of the module preceding the logical sequence. An unlimited number of tests was allowed on each module, and no time locks were in operation (this turned out to be a tactical error, as students often did not make full use of the prescribed learning resources).

The leaning resources attached to the modules were principally of three types: (i) CAI lessons, either from the PLATO library or locally developped, (ii) notes handed out, and (iii) a textbook (3). In addition, students were occasionally directly referred to their lecturer. For example, a student having difficulty with certain problems in stereochemistry (where skill at visualizing three-dimensional objects represented in two dimensions is required) might be instructed to discuss this with his lecturer, who in turn will explain the problem with the use of molecular models.

The questions entered in the PLM modules covered the full range of question types available on the system. As far as possible, constructive feedbacks were entered, appearing if a student entered the wrong answer. These feedbacks must of necessity be brief, but contain enough information to motivate the judgement ("correct/incorrect") awarded by the computer. The instructional value of these feedbacks is high, and one student remarked that for revision purposes (when "no-risk" testing was in force), he purposely entered wrong answers in order to see the feedbacks.

As much variety as possible was built into the question episodes, and whenever indicated, graphics were made an integral part of the question. Further, if at all feasible, sizeable question banks were created covering a particular objective, and questions drawn randomly from the bank. For example, mastery of an objective dealing with bioenergetics required the provision of *one* correct solution to a numerical problem randomly drawn from a bank of twenty-five similar problems, or, mastery of an objective in the field of protein biosynthesis required discrimination of four out of five true/false items, randomly chosen from a bank of thirty such questions, This ensured that students did not receive identical sets of questions, and that retesting on non-mastered objectives provided a meaningful test of retention of newly acquired knowledge, assuming that students did in fact study all the leaning resources prescribed by the computer[*].

The intructional objectives need not cover material dealt with in class. In this way the students may be referred to sources such as journal articles covering relevant material. This is of particular value in introducing students to independent study of literature and being able to monitor their activity.

As far as record-keeping is concerned, students were at all times able to gain access to their own records. At regular weekly intervals, printouts of the average progress of the class through the curriculum as a whole as well as the individual courses were displayed on the notice board, and this served to inform students of their own individual progress relative to that of the whole class.

Results

The effectiveness of CBE is a perennial favourite for discussion. How would one rate the success or otherwise of the approach described in this paper? The author would like to suggest two criteria whereby any innovation in the educational field might be evaluated. Firstly, are more students achieving the norms for mastery of the subject than in the past? In the present case, only 1 student (out of 34) failed the course, as determined by criteria in use before CMI was implemented, compared to 1981 when 9 students out of 29 failed the course. Secondly, do students become motivated towards the subject? If any innovation increased the pass-rate without producing students sufficiently interested in the subject to study it at a higher level, serious doubts would arise as to the viability and desirability of that innovation in a University environment. In the case study reported here, all indications are that a very high proportion of students are electing to take Biochemistry as major subject.

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[*] The computer has no way of enforcing the reading of a textbook reference, but can enforce the successful completion of a prescribed CAI lesson before an attempt at retesting on a CMI module is allowed. It would appear that a "lockout" of two hours, before which a student may not retest on a module would be sufficient to get the message accross that reading a prescribed text is a sound idea.

From the above, admittedly self-imposed criteria, we are encouraged to continue and to develop the use of CMI. There are other, less easily quantifiable benefits. In 1982, every student acquired a text-book, and made use of it. This was reflected in a better use of language in written work. Communication between lecturer and students was enhanced, and made more relevant, since student problems were well defined and remedied as they occured. By the end of the year, the average time spent on-line was 112 hrs per student. Coupled with off-line time, this amounted to a massive effort at organized self-study unequalled in the author's experience.

Finally, the question which inevitably arises concerns the level of effort *required by the university teacher* in order to successfully implement a CMI package. The answer is simple: a huge effort is required. This effort requires familiarization with CBE in general and the system in particular. It requires a restructuring of the course material, and a critical evaluation of what has been taught in the past. It requires a willingness to think anew about one's role as teacher and researcher in a University context. A large effort is demanded in the formulation of objectives, question design, feedback generation, and the critical selection of learning resources. Much time must also be spent in the day-to-day monitoring of the whole CMI activity. It is the author's conviction that in the final analysis, CBE will only succeed if students realize that behind the machine, there is a human being who is concerned about their progress.

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SELF-PACED COURSES FOR IMPROVING UNIVERSITY TEACHING

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INTRODUCTION

Self-paced courses are often considered as means for improving student achievement. Nevertheless, self-pacing could be used in college courses as an affective instrument for changing the students attitudes towards the teaching-learning process.

The application of a self-paced learning system during a sequence of four Physics courses yielded very good results and produced positive attitudes and responsability habits in students.

One of the main problem we have found through many years of college teaching is the negative attitude of students towards their own learning process.

Due to overprotection during the years of High School, they arrive at the University unable to face their new responsibilities with a positive attitude, waiting for their teachers to tell them what to do, how and when to do it. They do not seek by themselves the answer to their own questions, they don't look for the solution to their own problems. They just wait for the teachers to answer the questions and to solve the problems.

For years our books have remained closed by our students at the Library, not because we teachers wanted to keep them untouched but because students did not see the need for opening them. All they thought was needed, was given during the lessons, all they thought they had to learn was what the teacher said or what he wrote on the blackboard.

During lessons the students were so busy copying each word the teacher said or wrote having no time to understand what was said or written and could not even follow a chain of reasoning the teacher might pretend them to follow.

All the above mentioned made us look for another way of facing our teaching, look for a way which could induce in our students a different attitude towards their learning, making them responsible of their learning process. So finally we decided to adopt a self-paced teaching method and Physics courses were chosen to be applied.

Since we wanted an attitude change, and know it would take time, we decided to apply this new methodology throughout a period of four semesters which was necessary for the whole Physics sequence -Mechanics, Electricity and Magnetism, Thermodynamics and Modern Physics, from now on, Physics I, II, III and IV.

Besides, we saw the need of changing our evaluation system which required for the semester two partial and one final examination.

Considering the above two problems, the research project had two main objectives:

- to change the students attitude towards learning, and
- to design an evaluation system suitable for a self-paced course.

The Methodology and the Evaluation Model

Each of the four courses was divided into ten Units. The students were given a Study Guide for each one of the Units on which the Unit objectives were specified and some hints were given so as to help them to reach these objectives. Sometimes, when the Unit content was difficult or when the texts at the Library did not include the desired approach, supplementary material was added.

Students should consult all texts they could as a way to get information about the objectives they should master. The lessons were scheduled only to tell them which are the days of the week the teacher is available for cunsultation. During the scheduled hours they could ask for the answer to their doubts and could go to the lab so as to clarify some aspects of the Unit content.

When they had already worked for some time on the Unit, the teacher gave them a trial test which they had to answer by themselves and so decide whether they had mastered the objectives or not. Once felt sure of their mastery, they could ask for the Progress Test of the Unit. If they approved the Unit, they could receive the next Unit Guide. And so on until the date of the final examination at the end of the semester.

Together with the design of the Unit we built a pool of items where all possible items for measuring the mastery of the unit were included. Each pool of items consisted of about 150 items, which allowed us to construct five or more equivalent forms of the test for each Unit. One of these forms was the Trial Test, the others permitted the students to repeat the Unit Progress Test when failing to reach the mastery level established at the beginning of the course.

For the first two courses,the mastery level was fixed at 70 percent, which meant a student should answer correctly at least 70% of the test items in order to have the Unit approved. For the last two courses this mastery level was raised up to a minimum of 75% -all tests scores ranged from 1 to 100 points.

For the first course we tried to adapt the evaluation system to the general regulations at the University and the students were so given two partial examinations, the first one which measured what they mastered on the contents of the Units already approved, and the second one which measured what they mastered on the first ten Units. (This first course had been divided into 20 Units which didn't prove apropiate). Results indicating normal evaluation regulations couldn't be applied for self-paced courses. So, for the other three courses we suppressed the partial fixed examinations and only kept the final one. Since students seemed to respond quite well to the method and as a way to stimulate their pacing towards the end of the course, for Physics III and IV we eliminated the final examination for those students who had approved all the ten Units of the course during the semester.

The approved Units gave the students some points -a percentage of the test approval score- which were stored up and finally became the course semester qualification. This semester added score had a weight on the final course qualification, together with that obtained on the exam.

For Physics I and II, the exam qualification weight was fixed at the beginning of the course, but for Physics III and IV this weight depended on the number of Units approved during the semester. This way, for a student who had approved six Units, the exam weight was 40% and for a student who had approved nine Units the exam weight was only 10%. We found this a successful manner of encouraging students for a better progress during the semester.

The results obtained

We fell satisfied for the results obtained, since we did not only change the students attitudes but also improved their yielding on the Physics courses.

Table 1 shows some of the results obtained for the four courses.

Table 1: Mean results on the Physics courses

	Phys. I	Phys. II	Phys. III	Phys. IV
Number of students	21	20	14	13
Course passing rate(%)	71.[illegible]	80.0	92.9	100.0
Mean final score	55.4	57.8	72.2	70.5
Mean score on Units	75.4	78.6	81.3	81.7
Mean number of approved Units	7.7	8.8	9.1	9.0

The progress shown on the above Table is a clear sign of the change in attitude. The students became self-sufficient, they became responsible and could very well allocate their time for all they had to do.

Figure 1 shows the comparative progress on the four courses. On it, progress was estimated by the amount of Units approved with respect to the whole course. Rate of progress improved along the Physics sequence and the graph showing the results for Physics IV indicates that the students pacing was rather uniform, with no hurry but also without delays.

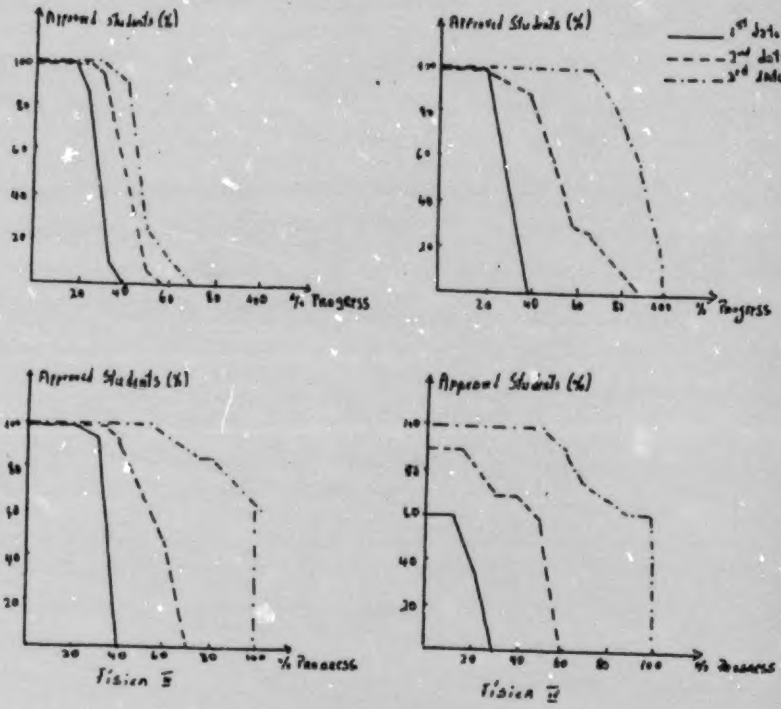

Figure 1: Progress rate on four Physics courses

The attitude change was also measured by the application of a Likert type questionnaire (1-5 scale items) which asked the students to state their agreement or disagreement with statements referred to several aspects of the method and also reforred to their opinion with regard to the courses and the evaluation system.

Table 2 presents the mean values obtained on the application of the questionnaire and the corresponding reliability coefficients, determined by split-half method, on all four courses.

Table 2: Attitude of students

	Phys. I	Phys. II	Phys. III	Phys. IV
Mean Attitude#	3.26	3.71	3.92	4.91
Reliability coefficient	0.6642*	0.7478*	0.9030*	0.9411*

# 1 = very negative; 5 = very positive

* significance level 0.01

We shall mention the answers to some of the questionnaire items. When first asked whether they liked the method, only 35% of the students said yes. At the end of the third course, the same question received 93% of positive answers. Table 3 shows the mean answer to some items on two opportunities -first and last course.

Table 3: Mean items answers*

Statement	First course	Last course
I am good at Physics	3.35	4.23
Physics is easy for me	2.9	3.92
I am proud of my doing in Physics	4.1	4.92
I like to study Physics	3.7	4.29
I feel sure of what I learn in Physics	3.86	4.23

* some examples to show response pattern

CONCLUSIONS

Self-paced courses at college could be a very effective way to improve students attitudes towards their own learning. When progressing at their own pace the pressure to which the students are subject is lessened, specially when they just arrive to college. It allows them to study calmly, eliminating the natural tensions that pursue those who do not feel sure of what they must show to master. Being able to repeat the Units, they do not approve, the students get acquainted step by step with college courses demands, but always remembering that they have to show mastery of the course content at the end of a fixed period: this, they can never forget and it is the teacher duty to keep this fact in his students mind. The teacher must keep watch of each and all of his students, specially when first teaching self-paced courses, in order to help them to learn how to manage properly their own learning.

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STUDENT SATISFACTION WITH SELF-PACED INSTRUCTION AND COMPUTERIZED TESTING: A CASE STUDY

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Large enrollments are always a problem to the conscientious instructor.* Motivating, teaching, evaluating and counseling large numbers of students are never easy tasks. The Personalized System of Instruction (PSI) strategy attempts to cope with these challenges and is well-suited to the use of micro-computers for testing purposes. This paper describes my effort to use PSI and micro-computers in an introductory course in American Government complete with an analysis of student reactions.

PSI

The PSI format (aka the Keller Plan) tries to service a large number of students in an individualized way using minimal staff. Although it takes a different form with each instructor using it, it usually has the following features:

1. Students are tested more often than in the traditional lecture format over smaller amounts of material. I have ten testing units in my course, each covering either one or two chapters from the text.

2. Students must earn a higher than usual score to pass each test. This is justified by the relatively small amount of material covered in each exam. Seventy-two is a passing grade in my course and 76 is a C. Ninety-two and above is an A while 80 to 88 is a B.

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*I am grateful to my graduate assistant, Sara Brandes, for her assistance in this study.

3. Students are given specific information about how the course works and how to earn a particular grade. Each of my students gets a ten page handout describing the course and its procedures.

4. Students can retake an exam unit to earn a higher grade. Students can take a different version of each testing unit four times to earn a better grade in my course.

5. Students work at their own pace. Students move individually through the ten testing units at their own speed. The testing room is open 27 hours a week.

6. Grades are often assigned on the basis of the number of units the students choose to complete. Students must pass all ten units in my course. There is no curve.

7. There are no or few plenary class lectures. Students work from textbook materials. I give three lectures to begin each course.

8. Undergraduate proctors give individual help to students by explaining material and answering their questions about course procedures. I recruit proctors from among the best A students who have already taken the course. There are always at least two of them in the testing room.

MICRO-COMPUTERS AND PSI

I used a manual process in the course initially: proctors did all grading by hand and gave students explanations of material in face to face discussions. The number and quality of student/proctor interactions were very high consequently. That was the good news. The bad news was that this procedure was messy to administer and open to all kinds of security problems. The proctor room did not have to be open very long before exams and answer keys were exposed on every table. Only a miracle prevented them from being stolen, lost, or mutilated. Students could hear other student/proctor conversations and find out what was on other exams. Things also got very noisy and this disturbed students taking exams. These problems developed when enrollment was only 80 students. Enrollment is now 445 and climbing every semester. I clearly needed to make some changes.

Enter the micro-computer. Our department had obtained a number of these machines and disk drives using funds from a government grant. The micro seemed an obvious answer to many problems: students could use them individually at their own pace without the security and other problems associated with the manual process. I consequently had programmers develop software that had the micros do the following:

1. Randomly select twenty-five objective questions for each test from a stable of questions available for every testing unit.

2. Give the student a list of answers from which to choose the right answer.

3. Give the student two opportunities to run through the test with an infinite number of opportunities to change his answers each time.

4. Grade each test immediately after the student finishes going through a test the second time.

5. Offer an opportunity to review each question after reporting the grade so that the student:

    a. Sees the correct answer on the terminal;
    b. Obtains a short explanation of the correct answer on the terminal;
    c. Gets the page number in the textbook where he/she may find more explanation and discussion of relevant material.

In addition, the program gives the student specific, understandable instructions on each page about how to proceed at each stage of the examination process.

STUDENT REACTIONS AND COURSE PROCEDURE

Using the micros has been a panacea in almost every way. They have solved many procedural problems and expedited the entire test taking process. Their use, however, has generated one major concern: the extensive face to face student/proctor discussions that marked the manual process occur much less often now. Most proctor/student contact takes place now when proctors record student grades. If there is extensive discussion of material between students and proctors now, it involves students having serious problems passing their exams. The average to above average student rarely talks about course content with proctors or me.

The decline in student/proctor contact is a concern because it makes it harder for my proctors and me to monitor student reaction to the course during the term. How can we begin to know when students need help or encouragement? If students cannot pass a unit after two tries, they have a clear need that we can move to confront and satisfy. But what about students working at a C or B level who would like to improve their grades but are hesitant or shy about making demands on our time? Students often hesitate to initiate discussions about material with proctors because they do not want to appear "dumb" before their peers; because they are sometimes shy; and because they do not want to do anything to "disrupt" the operations of a busy testing room.

Self-paced courses have their strengths; but they carry a major cost in the distance they place between instructors and students. The use of micros has the impact of making this distance even greater because instructors -- i.e., professor and proctors -- become managers and expediters only rarely helping the micros transmit course material to the students.

This concern gives rise to the following question: is this distance a problem for students or is it only a problem for instructors accustomed to the more traditional lecture format? I surveyed 170 students in the course during the fall term, 1982, to answer this question. On the basis of my analysis, my general conclusion is that most students do not perceive a problem. Twenty-four percent of the sample (41 students) said they missed the traditional lecture format. Eighteen percent (30 students) said they were concerned that they do not see the professor as much in the course as in other courses. Twenty-two percent (38 students) thought they would get more out of the course if they had more interaction with the professor.

Thus, distance between staff and students is viewed as a problem by a relatively small minority of students. My data suggest that the use of micros is perceived as even less of a problem. Ninety-two percent (156 students) said that they felt comfortable working with a computer in the course. Only four percent (7 students) said they would prefer taking their tests using a number 2 pencil and mark sense paper. These findings are particularly interesting because forty-six percent of the sample (78 students) had never used a computer before taking the class.

The moral of the story seems to be that there is a considerable amount of self-selection taking place. Students thinking about which section to enroll in find out how sections are taught. My department publishes a listing of courses describing the use of micros in my course and word of mouth does the rest. That my course attracts students more inclined toward using micros is supported by the low percentage (12% or 20 students) of students who said the prospect of taking exams on a computer put them off at the beginning of the term. Fifty-two percent of the sample (89 students) said they knew someone who had taken the course in the past.

It is certainly heartening to know that, on the basis of this analysis, most students are not uncomfortable with the two major aspects of the course:

self-pacing and testing on micros. There are two reasons, however, for continuing to search for ways of making the course work better from the students' point of view. The first is that one should never rest on one's proverbial laurels. I take this as a general principle. There are students who are uncomfortable with one or both major characteristics of the course. As an instructor, I have to concern myself with finding and helping them. Second, my course is going to grow in enrollment. Faculty numbers and classroom availability have been declining in relation to student numbers. Individual section enrollments have consequently been increasing. Courses using PSI strategies have higher ceilings on enrollments as my present enrollment of 445 testifies. PSI cources will therefore absorb larger numbers of students if this trend continues and there is little reason to doubt that it will not. Self-selection may consequently be less and less of a factor in explaining why particular students take the course.

Improving the course requires knowing something about those students expressing concern about the use of micros and self-pacing. The table below shows relationships between orientations toward these two course characteristics and factors describing student respondents.

Student perceptions of proctors and the quality of their work are clearly correlated to whether or not students are comfortable taking tests on micros. The findings in the table suggest that students tend to be more comfortable with micros if they view proctors as caring, accessible and capable of transmitting course content effectively to them. Not surprisingly, students who are uncomfortable with micros tend to prefer getting their explanations of material from proctors rather than from the tube. In addition, students having problems with self-pacing seem to get little joy from testing on computers. The last correlation listed in the table lends unfortunate support

CORRELATES OF STUDENT CONCERN WITH THE USE OF MICRO-COMPUTERS AND COURSE FORMAT (N = 170)

Factors	Comfortable Using Micros	Miss Lecture Format
1. Would you like proctors to explain things instead of the computer?	-.26(.0004)*	.09(.12)
2. Does not seeing the professor much concern you?	-.09(.13)	.28(.0001)
3. Would you get more out of the course if you had more contact with the professor?	.01(.45)	.23(.0011)
4. Does self-pacing cause you problems?	-.27(.0002)	.27(.0002)
5. Do proctors know what they are talking about?	.17(.0123)	.00(.49)
6. Are proctors open and friendly?	.25(.0005)	.05(.27)
7. Do proctors seem to care about your progress?	.24(.0008)	-.15(.0232)
8. Are you a freshman, sophomore, junior or senior?	.02(.41)	.17(.0115)
9. Are you male or female? (1=Male, 2=Female)	.21(.0028)	.02(.38)

* The correlation is a Pearson's R followed by its significance in parenthesis.

to an old stereotype: that women tend to be less comfortable with technology.

Null findings with respect to micros in the table are also interesting. Contact with the professor does not seem to have a relationship to whether students are comfortable using a micro and neither does student experience as measured by what year they are in.

The correlation tying a preference for more contact with the professor to missing the traditional lecture format is unsurprising. Students who miss the lecture format also tend to find problems with self-pacing, or controlling their own schedules. In addition, students with more experience and more years tend to be more comfortable with self-pacing. At the same time, however, student perceptions of proctors as sources of explanation of material, as more or less capable, and as more or less accessible, appear unrelated to orientations toward course format. The preferences of some students for the traditional lecture format may be so strong that they fail to see the potential benefits of interacting with proctors. There is a weak correlation tying those who do not see proctors as caring about their progress to missing the lecture format. A higher level of proctor activity designed to advertise a concern for student welfare may, consequently, lead some students to feel more comfortable with self-pacing.

Two patterns emerge from these findings. First, the quality of proctor performance is very important. Correlations show that this is clearly the case with respect to students uncomfortable with taking tests on micros. Future reforms in proctor procedures in my course will be based on the expectation that student unease will be mitigated by more accessible, caring proctor behavior. I will also try to identify students who are unhappy with computer discussions of material so that they can get what is for them more satisfying explanations from proctors. The second pattern points to my visibility and accessibility to students who miss the traditional lecture format. Having published office hours and spending approximately one hour a day in the testing room are clearly not enough for some students. A possible way of resolving this may be scheduling an hour every week to lecture on some topic in American government. I am unconvinced that this will work, however, because I tried it once and found only 2-3 students attended after the fourth or fifth week.

There were a number of factors that had no relationship to either dependent variable at all. Being comfortable using a micro and orientation to self-pacing did not correlate with:

1. Having friends among other students in the course.
2. Knowing more, fewer or the same number of students in the course as in other courses.
3. Having used a computer before taking the course.
4. Knowing how to type.
5. Being bothered while testing by noise or movement in the testing room.
6. Coming from an urban or rural background.
7. Being an A, B, C, D, or F student.
8. Liking or doing well in the social sciences.
9. Holding a part-time job.
10. Whether parents went to college or not.
11. Full or part-time student status.

I had hypotheses suggesting a relationship between these factors and one or both of the dependent variables. None of them panned out. Space limitations preclude discussing them. The reader can probably guess what my hypotheses were.

Finally, it is necessary to issue a warning about my findings. The numbers of students expressing discomfort with using micros (14 students or 8% of the sample) and with the self-pacing format of the course (41 students or 24% of the sample) were relatively small. Although my findings are plausible, they should not be considered final as a consequence. This is particularly the case with respect to correlations using student orientations toward the micros as the dependent variable.

TEACHING REMEDIAL ELIGIBLE COLLEGE ENGLISH STUDENTS IN STANDARD FRESHMAN ENGLISH CLASSES

Roger G. Baker

Two truths about remedial education seem to be: 1) remedial education is expensive and 2) no approach has yet been identified as completely successful. Crosby (1974) points out that special courses cost 80 percent more than regular courses. Swofford and Swofford reviewed 40 remedial programs and found that "no school indicated highly satisfactory success in their efforts, whether they called it Guided Studies, General Studies, Developmental Studies . . . The responses displayed a good bit of vague circumlocution, and the strongest positive evaluation given a developmental program was an occasional . . . seems . . . satisfactory" ([1973], p.3). In looking at community college programs, Moore ([1976] p.1) noted that "whether or not the community college is really able to define or cure academic deficiencies has not been confirmed with hard, unequivocable, evidence."

Despite these problems, college remedial courses increased by 22 percent between fall of 1979 and fall of 1980 according to a survey conducted by The Chronicle of Higher Education and published in June of 1981 (Magarell). The increase in basic grammar and writing remedial courses was 29.7 percent during the same period.

This growth in college remedial classes came during a time when the National Center for Education Statistics estimated that college enrollment increased 3.2 percent (Magarrell, 1981). It was also at a time when resources for higher education seemed to be dwindling. This paradox of dwindling resources and increases in remedial instruction can't persist.

Even though remedial classes in the United States presently amount to only one percent of all courses offered at private colleges and three percent of all courses offered at public colleges, it seems appropriate to study the effectiveness and the effeciency of these courses in solving the remedial problem as compared to the regularly established courses of study.

It seems especially important to evaluate often expensive remedial programs as budgets get tighter. Scully (1981) noted that many colleges and universities plan to reduce or stabilize enrollments with stricter entrance requirements. The eliminated courses in many cases will be remedial in nature. This is in contrast to the 1980 growth noted earlier.

Most evaluations of remedial programs focus on the progress of students in remedial classes. Few have attempted to compare the performance of remedial students in remedial classes with remedial eligible students in standard classes as this study attempted to do with English students.

Since 1966 there have been 32 journal articles and 52 other references cataloged in ERIC which use a descriptors remedial instruction or remedial programs/and English/and higher education or college English. None of the journal references included a comparison of remedial eligible students not in a remedial class with similar students enrolled in a remedial class.

One paper (House, 1980) presented at the thirty-first annual meeting of the Conference on College Composition and Communication compared compositions written by remedial and non-remedial college freshmen. The House study (1980) noted that "results showed that the only characteristic that clearly distinguished between the three groups [two remedial and one standard] was the mean number of words per essay. No significant difference was found in the frequency with which any of the errors examined appeared in remedial 099 and in nonremedial 101 essays."

PURPOSE OF THE STUDY

Most studies of remedial English focus on the gains remedial students make in remedial classes (Lunsford, 1978). Such is not the case with this study. The objective of this study was to evaluate the performance of remedial eligible students in remedial and standard English courses at a two-year college (Snow College). The achievement of students in remedial classes as measured by the McGraw-Hill Writing Test was compared to the achievement of similar students enrolled in the standard freshman composition courses at the college.

METHOD

At Snow College students who scored in the lower quartile of the McGraw-Hill Writing Test were encouraged by advisors to enroll in a remedial English class, English 51. According to the catalog, this class promotes the "development of skills in sentence and paragraph structure, spelling, punctuation and usage for students deficient in those skills." The standard freshman English course is English 101, Expository Composition. The catalog description for this course reads as follows: "Basic composition and reading emphasizing effective expository writing. Review of Grammar. Weekly Themes." Students scoring in the lower quartile in the McGraw-Hill Writing Test also often appear in these standard English composition classes. One of the weaknesses of this study is the self-selection process that put some students in the remedial courses and others in the standard courses.

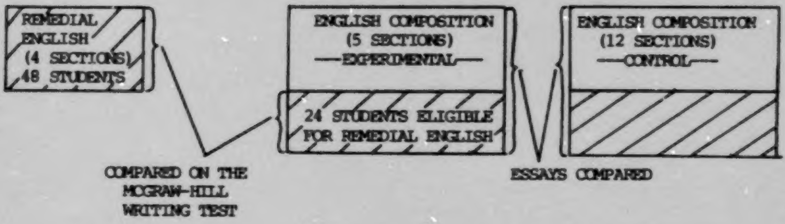
This study compared the performance of 48 students in 4 sections of a remedial English class (English 51), and 24 students with similar McGraw-Hill scores in five sections of freshman English Composition (English 101).

The difference between the content of the English Essentials (51) and the English Composition (101) are important. The English Composition class teaches English skills only in the context of effective expository writing. The rules of grammar, punctuation and spelling are not taught explicitly except as problems are discovered in the weekly themes students are required to write. What is taught in English Composition is the organization of and effective communication through expository writing.

As a control to assure that the purposes of the English Composition (101) class were not compromised in the experiment, a standardized essay assignment was given at the first of the class and at the end. A random sample of 26 pre- and post-essays was chosen from the five sections of the experimental English Composition classes and 19 pre- and post-essays were randomly selected from 12 English Composition classes not involved in the experiment. Each composition was reviewed independently by two teachers using a standardized evaluation process developed by the English Department. Figure 1 is a graphic representation of the research design.

FIGURE 1

Research Design


REMEDIAL ENGLISH (4 SECTIONS) 48 STUDENTS
ENGLISH COMPOSITION (5 SECTIONS) —EXPERIMENTAL—
24 STUDENTS ELIGIBLE FOR REMEDIAL ENGLISH
ENGLISH COMPOSITION (12 SECTIONS) —CONTROL—
COMPARED ON THE MCGRAW-HILL WRITING TEST
ESSAYS COMPARED

DATA SOURCE

The McGraw-Hill Writing Test has sub-tests. These are: Language Mechanics, Sentence Patterns, and Paragraph Patterns. The test reports junior college norms and converts raw scores to standard scores which have a mean of 50 and a standard deviation of 10.

The essay evaluation was a system devised by the English Department. Two ratings were made on each essay by two qualified individuals not associated with the college.

RESULTS

A serendipitous finding was that the attrition rate in the remedial sections was 24 percent and the attrition of students eligible for remedial English but attending the English Composition classes was 14 percent. Retention of remedial students was greater in the English Composition.

Evaluation of the essays of the experimental sections of English Composition and the control sections showed statistically significant gains at the .01 level of confidence from the pre-essay to the post-essay. There was no significant difference between the experimental and control sections on the essay criteria indicating that English Composition instructors had not compromised the objective of the English Composition classes to accommodate remedial students.

TABLE 1

Comparison of Student Essays

Experimental Sample		Control Sample		Post-test Difference
pre-essay	post-essay	pre-essay	post-essay	
n 26 mean 81.9 sd 33.37	26 101.2 43.27	19 73.5 29.4	19 102.3 39.54	difference = 1.1 t = 0.0886
pre/post difference $\bar{\Delta}$ 19.27 t = 4.168*		pre/post difference $\bar{\Delta}$ 27.18 t = 4.773*		

*Significant at .01 level (one-tailed test)

Statistically significant gains were made by the remedial English classes on the Language Mechanics sub-test and the Sentence Patterns sub-test. There were no other statistically significant gains made by remedial eligible students in the English Composition classes even though there were slight gains.

Despite apparent gains by remedial students, on no sub-test was there a significant difference between the remedial English students and the remedial eligible students in English Composition classes.

TABLE 2

Remedial Students' (English 51) Scores on McGraw-Hill Writing Test

	Language Mechanics		Sentence Patterns		Paragraph Pat.		Total	
	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A
n	48	48	48	48	48	48	48	48
mean	36.6	38.7	37.3	41.4	42.6	44.6	36.2	39.5
sd	7.29	7.22	7.79	7.06	8.16	8.29	7.13	5.41
	pre/post diff.		pre/post diff.		pre/post diff.		pre/post diff.	
	$\bar{\Delta}$ = 2.042 t = 1.806*		$\bar{\Delta}$ = 4.104 t = 3.564*		$\bar{\Delta}$ = 1.958 t = 1.580		$\bar{\Delta}$ = 3.270 t = 4.202*	

*significant at .05 level (one-tailed test)

TABLE 3

Remedial Eligible Students (English 101) Scores on McGraw-Hill Writing Tests

	Language Mechanics		Sentence Patterns		Paragraph Pat.		Total	
	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A)
n	24	24	24	24	24	24	24	24
mean	39.3	39.6	38.1	40.1	41.1	41.4	37.7	38.5
sd	4.78	6.06	6.38	5.98	5.79	6.28	3.31	4.40
	pre/post diff. $\bar{\Delta}$ = .3333 t = .2996		pre/post diff. $\bar{\Delta}$ = 1.058 t = 1.294		pre/post diff. $\bar{\Delta}$ = .2500 t = .1331		pre/post diff. $\bar{\Delta}$ = .7917 t = .9231	

TABLE 4

McGraw-Hill Scores of All Students (Including Remedial Eligible) in English 101

	Language Mechanics		Sentence Patterns		Paragraph Pat.		Total	
	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A)	Pre (B)	Post (A)
n mean sd	91 46.4 7.82	91 46.3 8.19	91 45.7 7.86	91 47.3 7.48	91 49.5 8.55	91 49.8 9.24	91 46.2 6.92	91 47.0 7.59
	pre/post diff. $\bar{\Delta}$ = .1868 t = .2568		pre/post diff. $\bar{\Delta}$ = 1.615 t = 2.160*		pre/post diff. $\bar{\Delta}$ = .3297 t = .3143		pre/post diff. $\bar{\Delta}$ = .7802 t = 1.405	

*significant at .05 level (one-tailed test)

TABLE 5

McGraw-Hill Post-Test Score Comparisons of Remedial Students and Remedial English Students in English Composition

Remedial English (51)	Language Mechanics $\bar{x}$ = 38.7	Sentence Patterns $\bar{x}$ = 41.4	Paragraph Patterns $\bar{x}$ = 44.6	Total $\bar{x}$ = 39.3
Remedial Eligible English (101) Language Mechanics $\bar{x}$ = 39.6	diff.=0.9 t = .5566			
Sentence Patterns $\bar{x}$ = 40.1		diff.=1.3 t = .8244		
Paragraph Patterns $\bar{x}$ = 41.4			diff.=3.2 t = 1.765	
Total $\bar{x}$ = 38.5				diff=1.0 t =.7754

no significant differences

CONCLUSIONS

1. The attrition rate of remedial students was greater in the Remedial English than was the attrition rate of remedial eligible students in the Freshman Composition classes.

2. Freshman Composition teachers did not appear to compromise the objectives of the English Composition classes to accommodate remedial students. This conclusion is based on the fact that the independent essay ratings for the experimental and standard sections were not significantly different.

3. Significant gains were made in Language Mechanics and Sentence Patterns in the remedial courses, the gains were not, however, significantly different from those made by remedial eligible students in the Freshman Composition classes.

This study did not clearly demonstrate whether or not remedial English or standard Freshman Composition classes were more effective for remedial eligible students. The study did demonstrate, however, that remedial eligible students can benefit from a standard Freshman English class and can, in fact, make as much progress as similar students in Remedial English classes. It is also important to note that Freshman English teachers can accommodate the remedial students without compromising the objective of the class.

The fact that the remedial classes were not clearly superior in accomplishing the remedial function to the standard classes is an important finding which raises a question of cost vs. benefit.

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RETESTING AND HIGH RISK STUDENT ACHIEVEMENT IN A COLLEGE REMEDIAL MATHEMATICS COURSE

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Introduction

Retesting is widely used as one of the major components of a personalized system of instruction (Kulik, Jaksa & Kulik, 1978). A number of studies carried out at the high school through college level (eg., Hammer and Henderson, 1972; Glucksman, 1973; Chase and Doerann, 1973; Crouse and Idstein, 1973; Crouse, 1974; Golden and others, 1974; Yens and Martuza, 1975; Atwood and Atwood, 1978; Catron and Thompson, 1979; Gosser, Packwood, and Walters, 1979; Deboer, 1980, Hobbs, 1981) have provided some information regarding the retesting tactic in various disciplines. For example, Hammer and Henderson (1972), found that retesting on problems generated by a computer would seem to be ideally suited to correspondence study and to the audio-tutorial approach to learning. Chase and Doerann (1973) found that repeatable testing is designed in response to some of the criticisms of the single test approach, such as measuring speed of learning and of recall rather than mastery, the creating of unnecessary anxiety, and the penalizing of students who misunderstand objectives and study inappropriate material. Golden (1974), Yens and Martuza (1975), Gosser, Packwood and Walters (1979), and Hobbs (1981) all reported evidence in favor of repeatable testing. On the other hand, Glucksman (1973), and

Deboer (1980), provided little support for use of repeatable testing. Waits (1973), found that the availability of retests created a false sense of security in the minds of the students. Deatsman (1979), concluded that retesting was certainly not benefiting his mathematics students and that it might actually have been harming the slower students in the individualized program. However, the majority of studies revealed that repeatable testing did relieve pressure, anxiety, and facilitated learning (Chase and Doerann, 1973; Hammer and Henderson, 1972; Yens and Martuza, 1975; Hobbs, 1981). The literature reviewed a conflicting report concerning the effect of retesting in various subjects. Since there were no studies reported on the use of repeatable testing for teaching mathematics to remedial students in college, there is indeed a need for additional research in this area, especially the effectiveness of learning mathematics after the retesting had been incorporated.

The Present Study

The study involved two groups of students in the college remedial mathematics classes. The experimental group employed retesting which allows students more than one chance to demonstrate his or her competence with the material. The control group employed single testing with no chance of retesting.

'he study was designed to determine whether the students in the retesting group resulted in a significant improvement than the non-retesting group in the student's mastery of mathematics content.

The Subjects

The main subjects of this study were 138 remedial mathematics students at Augusta College, Augusta, Georgia. Augusta College is a senior unit of the University System of Georgia.

All subjects were assigned to remedial classes according to the criteria established within the guidelines set by the University System of Georgia for the placement of students in remedial mathematics courses.

The criteria for assignment are the following: (University System of Georgia, 1973)

1. A combined SAT score of 650 or less, and

2. A score below T-60 on the Basic Skill Examination.

The BSE was developed by the Board of Regents of the University System of Georgia for the Developmental Studies Program students in all units of the System. It was used as a placement test and also designated as an exit instrument for the students in the program. Local norming and statistics were tested and determined by the Testing Center at this college.

The subjects were free to choose their sections. The classes were assigned randomly as retesting classes or non-retesting classes. Fourteen were discarded from the study in retesting classes, and seventeen were excluded from study in non-retesting classes due to the following reasons:

1. The were volunteering Developmental Studies Program students, and did not take the pre-BSE.

2. They failed to take post-Bse or withdrew from the College.

3. Six students (out of sixteen) were randomly eliminated

from the non-repeatable testing classes for the purpose of equalizing the size of sample space of both groups for statistics. The final number in the study was 69 each for retesting group and non-retesting group.

Instructional Method

In order to reduce variability due to the teacher variables, closed monitoring of the non-investigation instructor's methods took place to insure that all classes were similar in some extent. Three instructors were involved (including investigator) in this study. We all used the same text book, uniform class syllabus as well as similar instructional approach. All classes met five times per week for 50 minutes every day for 10 weeks. The following table shows the typical patterns of all the classroom activities:

Table I

Classroom Teaching Activities Chart

The PATTERN:

1. Lecture . . . Introduce new materials
   Approximately 10 - 20 minutes
   At least 4 times per week

2. Discussion or classroom assignments
   Approximately 30 - 40 minutes
   At least 4 times per week

3. Hour examinations and quizzes
   At least 12 hour examinations during the quarter

The only distinction between these two groups are examinations. For the retesting group, it will allow students to have second or third chances to retake the examination. For the non-retesting group, no repeatable testing was allowed.

In the retesting group, students were required to pass each test at a level of at least 80% or be retested in an alternate form. For the non-retesting group, 80% was also required to pass each test. All tests from both groups were graded and returned to students the next day so as to minimize the delay in feedback.

Evaluation Procedure

A total of 12 tests were given during the quarter for both groups. Pre-B3E scores were obtained from the Testing Center. Post-BSE tests were administered during the last week of the quarter. The final departmental examination (non-repeatable test) was held in the same three-hour period. BSE scores, classwork average, and final examinations were the exit criteria for the students in both groups.

Design

The statistical design used to test for treatment differences was a two-factor mixed analysis of variance with repeated measures on one factor.

The statistical model was for one between-group and one within-group factor. The between-group's variable had two levels corresponding to the two groups, retesting and non-retesting. The within-group's factor represented the pre-post measure of content of mathematics skill.

Results

Student Performance

During the first two weeks, the context of the quizzes was mostly arithmetic review and simple algebra. About 34% from the retesting group and 36% from the non-retesting group received quiz scores of at least 80. Fifty percent of students from the retesting group requested a second chance. Ninety percent of the students who retook the quiz scored above 85. Less than 10% of the second timers needed a second retest.

The students requiring a retest increased during the last three weeks. The average score of the test for both groups dropped to 65 when the test content involved radicals, inequalities and integral exponents. The BSE was administered during the last week of class. Students were required to do 60 multiple choice problems within 50 minutes.

Experiment Analysis

Pre- and post-test scores for both groups are presented in Figure I:

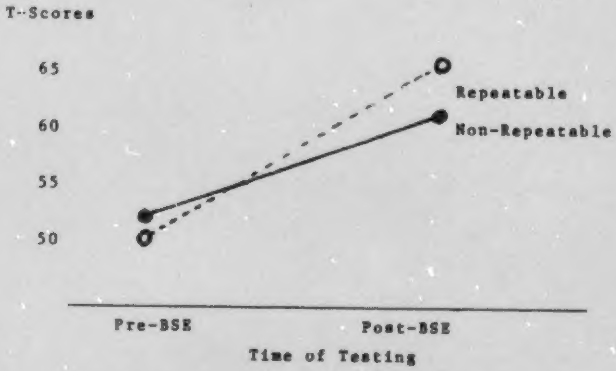

Figure I

The repeated measures effect demonstrated that both groups had significant increases ($P<0.001$), while there was no overall group difference. A significant gain by repeated testing interaction ($P<0.01$) shows that the retesting group had the greater gain in performance. The details of the statistical analysis are contained in Table II:

Table II

Summary of Analysis of Variance

Source of Variation	Sum of Square	Degrees of Freedom	Mean Square	F
Between				
Groups (A)	41.48	1	41.48	1.03
Error	5,478.99	136	40.29	
Within Group				
B (repeated Testing)	8,033.05	1	8,033.05	484.23*
AB (groups x repeated testing)	161.31	1	161.31	9.72**
Error	2,256.14	136	16.59	

* $p<0.001$

** $p<0.01$

Conclusion and Recommendations

The results indicate that there is no significant difference between the retesting and non-retesting groups at the posttest stage, even if the interaction ($P<0.01$) shows that the retesting group had the greater gain in achievement. There is no doubt that the retesting received overwhelmingly positive preference from the high risk students.

The results in this study suggested to the investigator that the following recommendations be specified with regard to the use of retesting in remedial mathematics courses:

1. Don't overemphasize test grades. Students should be informed that the most important aspects of the retesting are to find out their own weaknesses and strengths in the learning of mathematics.
2. Don't spend entire period on new material. Students should be motivated to find answers themselves rather than waiting on an instructor's solution. Try to limit the demonstration to less than 30 minutes.
3. Don't cover the material too fast. Students should be given more attention to their individual needs.

Retesting in mathematics, especially in the remedial mathematics classes, offers the teacher a way to deal with the "high risk" students who appear to have the highest anxiety in learning mathematics. It is feasible and perhaps advantageous--with certain constraints regarding the retesting--to develop a remedial mathematics course which focuses mainly on students' mastery of learning with the opportunity of repeatable testing under various teaching strategies.

In conclusion, the retesting is an easily implemented method for giving the high risk students a second opportunity to learn the material. It will change the teachers from emphasizing the test grade as punitive test-givers to teachers who use the test grade as an indicator of the student's weakness in certain areas. It will set very clear goals and seek to help all their students to achieve their individual tasks. The findings in this study indicate that the retesting in the remedial mathematics classes should be replicated on a larger scale in conjunction with several other independent variables, such as ages of subjects, difficulty of mathematics contents, and anxiety level toward examinations.

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TEN-MINUTE-TEST --- A METHOD TO EVALUATE THE ATTAINMENT OF STUDENT

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1. Irrespective of the use of technical means including computers, it is necessary to recognize that the object of higher education is to give necessary least knowledges, to teach ways where and how one can get necessary information and to train techniques to solve problems. Here, we explain a method to accomplish the purpose that the author has been using in these 14 years in teaching Quantum Mechanics and Statistical Physics to juniors and seniors and General Physics to sophomores. The method consists in giving a ten-minute-test each time to check the understanding of student of what was fundamental points in the lecture given last time and also to check whether the lecture was appropriate or not to let students recognize what instructor intended. The effect of the practice was positive.

Another point we want to emphasize is the use of a textbook in a lecture of undergraduate course. In Japan, old type lecture is given without textbook even when there is a standard textbook. By histrical reason, lectures on physics has been done mainly without textbook. In the early stages of introduction of modern physics, there are no textbook written in Japanese and students had to take notes of everything the teacher said and wrote to understand the new science correctly. This tradition was kept by successors of the first generation until now when there is many good textbooks in undergraduate level. I don't know if such a custom is surviving in western and other eastern countries. Lecture without textbook or corresponding materials forces students unnecessary toil to write down lecture spoken or written just to make a incomplete hand written copy of teacher's notebook or his memory which is now almost trivial material found everywhere. What is more needed now is to let students understand fundamental concepts in the subject, give them training to solve problems with orthodox techniques and make them enthusiastic to study further. If it is used correctly, textbook spares time, let students prepare the lesson beforehand and make them eager to study further.

2. What will be given in a lecture must be determined considering what was accepted already by students and what is given later or what is the goal of the lecture. Even though the starting and the final points are thus determined, the content is influenced by other lectures, exercises and experiments which students take simultaneously. We should take into account these factors to decide the content of a lecture if it is hoped to be successful. There is, however, the most important point left. That is the teacher-student relation. In the course of the lecture, the teacher must be careful to measure the response of the students and he should adjust his lecture according to it. This is an inevitable work he should do even though he considers the general schedule is set up correctly according to the procedure outlined above. If it becomes necessary to change his schedule somewhere, he can do everything about contents of his lecture but the starting point. Only point he could not and should not touch is the starting point which is determined by the level of students at the beginning and is out of his power. The ten-minute-test is also useful to determine the starting point.

3. The lectures were given once a week for 100 minutes. For

lectures to juniors and seniors, there are exercise (100 min.) once for two weeks.

Statistical Physics was divided into three, each for one semester; I and II to juniors and III to seniors.

Quantum Mechmics was given through 2 semesters to juniors.

General Physics as a whole was given through 4 semesters. The auther had a lecture of the latter half of General Physics including Electricity and Magnetism, Relativity, Thermodynamics Atomic Physics to sophomores.

In the beginning, motivation is necessary. Usually, it is considered natural to assume that students are eager to hear lecture and have enough knowledge about the theme which the teacher is going to talk. But this assumption has no reason. In my experience, almost all students have no knowledge about the lecture at all. So, it is necessary to give outlines of the lecture, histrical and social background of the branch of physics to induce interest about the subject. Even if they have enough interest to study the subject, it is sometimes partial and often strained and even mistaken. It is always necessary to give them correct image of the subject, and keep them on right way.

The method I recommend here is the ten-minute-test given every time in the beginning of the lesson to check the correct understanding of students about the content of the lecture given last time. The problems were intended to test fundamental concepts in the lecture and were easy to solve with the least knowledge. This test gives teacher the estimation of the result of his teaching and students can know what was fundamental in the lesson. If it is judged that a misunderstanding is fairly common, it is possible to supplement explanations to resolve it.

Examples of problems for the ten-minute-test are given on the end of this report.

In the course of lecture, there happens the difference of attainment in students. It will be especially effective to use computer to get information about this difference. But the ten-munite-test is also useful for this purpose and applicable in various situations. For advanced students it is necessary to give higher object to attract their interest. For retarded students it is necessary to judge the cause of their inability to follow the lesson and resolve it.

It happens that some student have more talent in another field than in physics. In such a case, it is easy to change the course if we can use the acrediting system ideally. (In Japan, the system is very formal and does not work effectively in many cases).

Textbook is also helpful for students in the undergraduate course. It is desirable to use good textbook or print in parallel to the ten-minute-test to give students perspective of the lecture, to make them easy to prepare and to review the lesson.

The textbooks I used in the above mentioned lectures were as follows;

F. Reif: Fundamentals of Statistical Physics, McGraw-Hill Kogakusha, Tokyo.

L. I. Schiff: Quantum Mechanics, McGraw-Hill Kogakusha, Tokyo.

T. Kinbara (ed.): General Physics, Shokabo, Tokyo (in Japanese)

Because of the present necessity of English language in study and in research in physics, I have been using English textbooks for junior and senior courses as much as possible.

5. As a results of the practice of the ten-minute-test and appropriate use of textbook, attainment and desire of students to study physics became higher. In the case of Quantum Mechanics such a student, who gives up to study the subject as an unattainable object, decreased.

Now, it is absurd if one do not consider that it is inevitable conditions the university professors have the ability and will to teach well. And, from the point of view of administration it is necessary to concider the balance of research and education. Anyway, the present system (in Japan and probably in developing countries) seems to have too much weight on the research in the undergraduate level and the educational offorts are looked very lightly. It is desirable to decide optimum ratio of stuffs and students, minimum scale of faculty unit, maximum number of student in a course considering such factors as mentioned above to improve university teaching.

6. Problems for the Ten-Minute-Test.

a. General Physics (1982 academic year)

1. What kind of branch in Mechanics is treated in Kinematics? Explain with examples.
2. Write down Coulomb's law and explain the physical meaning of it.
3. Write down Poison's equation and explain the difference between Laplace's equation.
4. Calculate electric field strength near a conductor surface with surface charge density s.
5. Calculate the capacitance C of isolated metal sphere with radius a.
6. Explain the origin of polarization charge.
7. Explain the origin of contact voltage difference.

8. What is the generation mechanism of Joule's heat?

9. Calculate an orbit of an electron in fields $E = (E, 0, 0)$ and $B = (0, 0, B)$ which is rest on the origin at $t = 0$.

10. Calculate magnetic flux density in a long solenoid using Ampere's law $\oint B_s ds = \mu_0 \sum_i I_i$.

11. Solve an equation $(L/w)d^2i/dt^2 + (R/w)di/dt + (1/cw)i = v_0 \cos wt$.

12. Explain the principle of relativity.

13. Explain that the solution of an equation $\partial^2 y/\partial t^2 = (\omega^2/k^2)\nabla^2 y$ is written as $y(r,t) = C_1 f(k \cdot r - \omega t) + C_2\ g(k \cdot r + \omega t)$.

14. Explain the coherence of light.

15. Explain briefly the Fresnel's half wave length band.

16. Explain the zeroth law of thermodynamics.

17. Mention the forms of energy transfer in matter.

18. Explain the almost static process (quasi-static process).

19. Explain the second law of thermodynamics.

20. An integral $\int_{P1}^{P2} \frac{d'Q}{T}$ for the irreversible process is smaller than the difference of entropy $S_2 - S_1$ of states P_2 and P_1.

21. Explain the Bohr's model of Hydrogen atom.

22. Where the limitations to the classical physics appeared?

23. Explain the difference between classical wave equation and Schrödinger equation.

b. Quantum Mechanics (1982 academic year)

1. Write down anything you know about hydrogen atom.

2. Write down three relations expressing the uncertainty principle and explain the meaning of them.

3. Write down Schrödinger equation for Ψ and then that for Ψ^*.

4. Separate the variables r and t in Schrödinger equation when Hamiltonian H does not depend on time.

5. Construct orthogonalized functions from u_1 and u_2 which are

normalized but not orthogonalized degenerate energy eigenfunctions.

6. Write down the momentum eigenfunction and show it's relation between the energy eigenfunction in free space.
7. Calculate an asymptotic solution for $x = \pm\infty$ of an equation $d^2u/dx^2 + (a - x^2)u = 0$.
8. Derive a differential equation for H_n from relations $H_n' = 2nH_{n-1}$, and $H_{n+1} = 2xH_n - 2nH_{n-1}$.
9. Transform $\partial/\partial x$ into spherical coordinates.
10. Express Hamiltonian of hydrogen atom $H(r_1,r_2)$ with center-of-mass and relative coordinates.
11. Calculate $S=(\hbar/2im)\,[u^*\nabla u-(\nabla u^*)u]$ when $u(x)=Ae^{ikx}+Be^{-ikx}$.
12. Explain meaning of the scattering cross section.
13. Calculate $(2\pi/ik)[f(0)-f^*(0)]$ when $f(0)=(2ik)^{-1}\sum_{l=0}^{\infty}(2l+1)\times$ $\times(e^{2i\delta_l}-1)$.
14. Discuss the relation of signs of U and the phase shift δ_l in a equation $d^2\chi/dr^2+[k^2-U(r)-l(l+1)/r^2]\chi=0$.
15. Calculate $(A^{-1})_{22}$ when $A = \begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 2 & 1 & 3 \end{pmatrix}$.
16. Write down the norm of a state function $u(r)$, $N=\int u^*(r)u(r)d^3r$, in matrix and bracket formalisms and show that N is invariant in terms of the unitary transformation.
17. When $a\,a^+-a^+a = 1$ and a^+a is the number operator, show that $\langle n-1|a|n\rangle=n^{1/2}$.
18. Write down the definition of a group.
19. Show that $[L_x,L_y]=i\hbar L_z$ if $\vec{L} = \vec{r} \times \vec{p}$.
20. Calculate a variation of E_m in the first order of perturbation H' where $H_0|m\rangle = E_m|m\rangle$.
21. Show that $(\Psi,H\Psi)\geq E_0$ for an arbitary normalized wave function Ψ when E_0 is the ground state energy of H.

22. Derive an equation satisfied by $S(\vec{r})$ when the energy eigenfunction is written as $u_E(\vec{r})=A\exp(iS(\vec{r})/\hbar)$ and explain the WKB approximation method.

23. Derive a formula for the energy density of states for free particles in a volume L^3, $\rho(E)\,dE=(2^{1/2}m^{3/2}L^3/8\pi^3\hbar^3)E^{1/2}\sin\theta\,d\theta\,d\theta\,dE$.

24. Explain the Born approximation.

25. Construct symmetric and antisymmetric wave functions from an arbitrary two particle wave function $u(r_1,r_2)$.

26. Construct four spin functions of two identical particles with spin 1/2.

C. Statistical Physics I (1981 academic year)

1. Determine C and calculate $\bar{v}^2$ with Maxwell distribution function.
2. What is the expectation value of the sum of number of spots when ten dice are cast simultaneously.
3. Deduce $f(E)\,dE$ when $f(\vec{v})d\vec{v} = C\exp(-mv^2/2kT)d\vec{v}$ and $E=mv^2/2$.
4. Write down spin states of a system with two particles with spin 1/2 at rest.
5. How many microstates there are when total energy of the equivalent three harmonic oscillators with eigenfrequency is $(7/2)\hbar w$.
6. Integrate dG along a path shown in the figure when $dG=adx + b(x/y)dy$ (figure omitted).
7. What is the meaning of the principle, that the entropy maximum is the stability condition, from the point of view of probability?
8. Calculate the value of kT when total number of state is given by $E^f dE$ and explain the physical meaning of the result.
9. Is it possible to make T negative? If it is possible, ex-

plain the physical meaning of it.

10. Mention three examples of extensive and intensive parameters, respectively.

11. Calculate a differential dH of a function H with independent variables S and p from the first law of thermodynamics using Legendre transformation.

A MODEL FOR COMPUTER-ASSISTED LABORATORY EXERCISES IN THE INTRODUCTORY PSYCHOLOGY CLASS

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A growing phenomenon in the past few years has been the adaptation of computer technology for individual use. The availability of home computers for everything from stock market forecasting to video games is quickly changing our society. Small children are becoming familiar with computers in video arcades, their homes, and their schools. In my own state of Minnesota "virtually every student from pre-school to college has access to computer-based education" (Williams and Robinson, 1982). Many children now in elementary school are "old hands" at using computers and both they and their parents expect computers to play an important role in their elementary, secondary, and college education (Williams and McDonald, 1982).

At the University of Minnesota, computer-assisted instruction has been in use since 1967-68 when hardware for instructional computing was first installed. The medical school has used interactive programs since 1969 and the law school since 1972. Computer-assisted instructional programs are widely used in many undergraduate programs as well. An important question for University educators is: How should computers be used at the college level in the future? Should computers replace teachers? Books? Classrooms? Or should they, as seems more likely, supplement the educational process as it now exists? If so, how might they serve as a supplement to "traditional" methods of teaching?

I recall observing a student at a computer terminal several years ago working through an experimental foreign language program. Most of the student's time was spent reading what was printed by the terminal. In this case, the computer served primarily as an electronic textbook and this struck me as an unfortunate waste of valuable resources. Why use a computer to do what a book does? Why not take advantage of the special capabilities that computers have?

Of course, recognizing and utilizing the advantages of computers is not an easy task. A current problem in the computer industry is that advances in hardware have far outstripped available software. Speaking from experience, this is true in higher education as well. Constraints on our time, budgets, and our expertise have generally caused us to lag behind available hardware. Needed are basic models for development of computer-assisted instruction. Perhaps then these models could guide University instructors in developing instructional packages and adapting to new technology as it is made available. This paper outlines an attempt to develop one such model.

In the summer of 1981 a University of Minnesota Graduate School research grant supported my basic developmental work on three computer-assisted instructional packages. These packages were designed to supplement one already in use. They were put into computer language and tested in my introductory psychology class the following year. During the summer of 1982 a grant from the University of Minnesota Educational Development Program allowed me to revise the computer programs and complete the ancillary materials for use in my class during fall 1982.

When I began development of these three packages I consulted the Index to computer-based learning (5 ed.) (University of Wisconsin, Milwaukee) and the Directory of teaching innovations in psychology (Maas and Kleiber, 1976) to determine what kinds of computer-assisted instructional materials existed for the field of psychology. I found that less than half of the twenty-seven catalogued packages were designed for introductory psychology, and most of those taught basic material. Only three included exercises for students to complete. It was apparent both that little computer-assisted instruction was available to introductory psychology students and that what was generally available did not make good use of the computer.

The computer-assisted instructional packages described here were designed to meet three goals. First, the packages were to complement course objectives. Because a primary objective of my introductory psychology course is to help students understand the method of experiment in drawing conclusions about human behavior, the packages were designed to teach the experimental method. Second, the packages were not to do things that might be done more efficiently by textbooks, standard programmed learning materials, or other less expensive means. To achieve this, the computer programs were to be interactive. Through simple branching techniques they were to provide information and then make certain that students could verbalize what they were supposed to know. Third, the packages were to be hybrid in nature. That is, they were to make use of both reading materials and interaction with the computer. They were also to require students to make written responses while working on the computer and later when drawing conclusions about their experience.

The three instructional packages described in this paper were designed to give students experience dealing with experimentally derived data. They are assigned after students complete a unit on psychological methods. This unit also contains a computer-assisted instructional package that drills students on the important elements of a psychological experiment they are assigned to read. At this point, then, students are prepared to record and interpret experimental data.

The instructional packages all have the same basic structure. First, students go to a computer terminal in the role of experimental subjects and the computer asks them to respond to stimuli it generates. The computer then explains the structure of the experiment and asks students questions in an interactive format intended to make certain they understand how the experiment was designed. Students cannot proceed until they work their way through this branching program. Once students have demonstrated that they understand the experiment, the computer directs them to tabulate their data on a worksheet. When this is completed, students leave the terminal and answer some general questions on the worksheet about their data.

The final step utilizes groups of six to eight students in their laboratory section. They are given laboratory worksheets which show them how to tabluate their individual data into group data. They then respond to worksheet questions that ask them to compare their individual data to the group data.

The three packages differ slightly in what they ask students to do. The second requires more complex tabulation than the first and the third more than the second. The first experiment has two two-level variables (i.e. four different types of stimulus person) determined by the computer. The second has one two-level variable determined by the computer and one three-level variable determined by students' scores on a personality test administered by the computer. The third has one three-level variable determined by the computer and one two-level variable determined by a median split of group members' scores on a behavioral measure of conformity.

The first package asks students to rate people on a one-to-five liking scale. Twelve hypothetical individuals are described with three trait adjectives taken from Anderson's (1968) list. Half of the individuals described have male names and half female. When they finish the rating task, students are told that they rated two different types of males and females to test the question in social psychological research of whether three moderately positive traits (e.g., gentle, serious, convincing) elicit more liking than two very positive traits and one somewhat negative trait (e.g., warm-hearted, opinionated, quick-witted). They are told that each individual has been described with the same total amount of positivity so that two competing theories can be tested against each other. Next, they are asked what their data shows and, as an illustration of the need for researchers to be open to other things their data might show, they are asked if sex of the individual made a difference. Students enter their "liking scores" into the computer and are asked whether their data supports either of the competing theories. Through a branching procedure the comptuer tells them whether they have drawn the correct conclusion. The group worksheet handed out in laboratory asks them to tabluate the group data, compare it to the individual data, and determine which theory was supported.

The second package asks students to provide two types of data. First, it asks them to rate ten hypothetical individuals with a five-point liking scale on the basis of statements the individuals are purported to have made. The statements were adapted from "power and toughness" items on the F-Scale (Adorno, et al., 1950) and were designed to portray the individuals as high or low on the "power motive." Second, students are asked to respond to items on the "Shortened F for Political Surveys" (Janowitz and Marvick, 1953) - an authoritarianism scale. Scores on this test serve as students' "power motive" scores.

Students are told that the experiment is designed to test the hypothesis that people like others with similar "power motives" and that people with low power motives are liked best. Students enter their liking scores and their own "power motive" scores. They are given feedback on what their scores mean and whether they were correct in saying their data did or did not support the hypothesis.

In the laboratory session, students are given a worksheet which directs them to tabulate the data according to group members' "power motive" scores (high, intermediate, or low). Questions about whether the group data support the hypotheses are also asked.

The third package asks students to play a "word game." Students are given a stimulus word and two accompanying words from which they are to choose a synonym. The students (mostly freshmen) find the task difficult because the words tend not to be in common usage (e.g., induration, accretion). Students are told that to be helpful the computer will report how many previous students picked each word.

After students finish the "game" they are told that they took part in an experiment on conformity. Because the game was so difficult they weren't expected to score at levels higher than chance. They were exposed to three levels of social influence because the supposed percentage of students choosing a word was fabricated and always in a majority of about 55%, 75%, or 100% for the incorrect word. Students are asked to enter the number they got wrong into the computer. Below chance responding is interpreted by the computer as evidence of conformity. They also indicate whether they responded differently to the three levels of influence (55% vs. 75% vs. 100%) and whether their data supports the hypothesis that higher levels of influence cause more conformity. The computer then gives them feedback on their resonses.

The laboratory worksheet requires students to separate the group into high and low conformers (by median split) and tabulate the group data. Students are also asked whether the group data supports the hypothesis and whether high and low conformers responded differently to different levels of influence.

The packages were evaluated with three methods during their first class use. First, we reviewed the worksheet grades to determine whether the questions posed on the worksheet were answered adequately. We found that students did a better than adequate job - demonstrating by and large that they understood the assignments and were able to complete them satisfactorily. Seventy-five percent of the laboratory groups got perfect scores on the laboratory worksheet which means they tabulated the data correctly and drew the correct conclusions about whether the data supported the hypotheses. Almost all of the other groups missed only one point of a possible five.

Second, the individual worksheets students brought to the computer terminal included an evaluation question. It asked them to indicate which of five statements described how much they enjoyed completing the computer part of the package. Statements were: "I didn't like it at all" (scored one), "I liked it some" (two), "I liked it quite a bit" (three), "I liked it very much" (four), and "I liked it better than anything else I've done in college" (five). Over all three projects, 3% of students selected the first alternative, 35% the second alternative, 35% the third, 22% the forth, and 5% the most positive. The mean response of 2.92 (with the standard deviation equal to .93) was quite positive.

Third, at the end of the term students completed a course evaluation instrument. It contained an item that measured students' assessment of the laboratory projects. Students were asked whether they disagreed strongly (scored one), disagreed moderately (two), agreed moderately (three), agreed strongly (four), or agreed totally (five) with the statement: "The laboratory projects were a beneficial learning experience for me." Only one student (less than 1%) disagreed strongly, 9% disagreed moderately, 36% agreed moderately, 32% agreed strongly, and 22% agreed totally. Once again, evaluation of the packages was positive with a mean response equal to 3.64 and the standard deviation of responding equal to .95.

In summary, the three means of evaluating the packages noted above reveal that students are able to complete the packages satisfactorily, find them interesting, and find them to be a beneficial learning experience.

The three packages met the goals set for them. They fit the course objective of giving students more experience dealing with the experimental method; they added a new dimension to the learning resources available to students; and they integrated computer and written work.

Several other advantages stem from the use of the packages and they will be the focus of future research. One advantage is that the packages increase the amount of attention given to students' individual learning styles and needs. The interactive format adapts to students. More research needs to be done to relate individual differences to utilization of and satisfaction with the packages. Secondly, because the packages were "hybrid" in nature, costs were held down. Students kept track of their data on a worksheet rather than on the computer. This may be an advantage but more research is needed to determine if it results in learning superior to that occurring when all responses are made on the computer with the machine providing the total feedback. These and other questions can be dealt with now that the packages are in place and are being successfully used by students.

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APPLICATION OF A STUDY OF DISCOURSE IN A LABORATORY SCHOOL SETTING TO UNIVERSITY CLASSROOMS

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The challenges inherent in the study of teaching exist at all levels of schooling but perhaps most persistently at the university level. While researchers have studied the teaching process from kindergarten through high school, the complexities related to the study of college teaching seem to inhibit such exploration. Thus the problems of students and professors in university classrooms go unaddressed despite the need for solutions. One such problem which seems to appear at all levels of schooling is student passivity. While professors may ponder over or complain about this behavior, little has been done to study it partly because the university classroom has been off limits for such research. If, in fact, active learning is valued in the college classroom, it may well serve college faculty to look at their teaching to identify behaviors which seem to invite or inhibit participation. As Muscatine* said to the Association of American Colleges, "we need to shift our emphasis from a narrow concern with subject matter to an emphasis on process" (Butterfield, 1982, p.B1).

If one of the goals of education in a democracy is to encourage students to express, develop and share ideas, it can be assumed that this is a worthy objective in college classrooms as well as at other educational levels. This is not to suggest that discussions should compete with lectures or other instructional methods, but rather that they are an important component in college classroom teaching. Since college teachers have devoted their efforts to the study of their discipline, it is not unexpected that strategies for eliciting discourse might be unfamiliar to them. Moreover, the commitment to impart knowledge from one's own discipline may take priority over discourse about it. Yet, fostering the expression and interchange of ideas may be one means by which students learn actively and through which the issue of student passivity is addressed. It is suggested in this paper that the findings gleaned from the study of discourse in a laboratory school setting may be useful in examining university teaching.

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The notion that the expression, development and sharing of ideas are central to learning is not new. Group discussions were considered as essential aspect of the learning experience as early as 1896 when John Dewey founded the Laboratory School at the University of Chicago. Similarly, Vygotsky's studies in the 1920's focused on the pivotal role of language in the development of thinking. Like Dewey, Vygotsky held that verbal interactions with adults was a powerful factor in the development of children's concepts.

More recent studies of classroom discourse (Taba, 1962; Bellack, 1966; Moffett, 1968; Barnes, 1976; Cazden & Mehan,1976) have examined the verbal interactions of students and teachers. Hoetker and Ahlbrand (1969) reviewed the results of observational studies of verbal behavior over the past fifty years. The communication pattern they most commonly found was the "recitation" or teacher question and student response. They raised the question, "What survival needs of teachers are met uniquely by the recitation?" (p.153). In the study described herewith discussions were examined which were not principally "recitations".

Method

The subjects of this study were one class of sixth/seventh grade students and their teacher. The class was in the Laboratory School of the Bank Street College of Education in New York City. The school constitutes one component of the College and functions as a laboratory for the demonstration of the philosophy of the College. This class was selected for study because verbal interactions in discussions seemed to consist of more than "recitations". Eighteen social studies discussions were tape recorded, transcribed, and analyzed, and twelve were used in the study.

The data were analyzed to describe the sequence and content of the discussions. An adaptation of the Bellack system (1966) was developed, using both a quantitative and interpretive appproach to the findings. Basically, the Bellack system identifies who speaks, when they speak and what they say. In this study Bellack's conventions or "moves", as in a chess game, were used to note who spoke and when they spoke, but the content of what was said, or "categories of meaning" were derived from a study of the data. It was through the development of categories of meaning that certain teacher behaviors emerged which may be applicable at the university level.

Very briefly summarized, there are four types of "moves": structuring, soliciting, responding and reacting. Structuring and soliciting are initiating moves, and responding and reacting are reflexive moves. The reacting move is particularly interesting because it represents an unelicited comment and is notable in analyzing teacher-student discourse.

Three categories of meaning developed from examing the content of the discussions: substantive, functional and procedural. Substantive categories of meaning refer to the cognitive and affective processes expressed in the discourse and include the following: to explain, speculate, infer, opine, and inform. Functional categories concern the course or direction of the discussion and narrow or broaden the focus of discourse. Like the substantive categories, these developed from noting what occurred in the discussions; however, functional comments were mainly made by the teacher and reflect her style of discussion-leading. These categories are: to clarify, highlight, recapitulate, restate, repeat and hold.* These categories are especially worthy of exploration in college teaching. Categories of procedural meaning relate to classroom management and organization and they, too, were made principally by the teacher. Procedual categories are: to direct, manage, suggest, and give turn-taking permission(or call upon a volunteering student). These categories would be less relevant in university settings.

Results

Several noteworthy results were revealed from an analysis of the discussions. As indicated earlier, the measure used to determine when a participant spoke was called a "move". A comparison of teacher-student talk showed that students contributed more often to the discussions than the teacher. They made 52 percent of the moves and the teacher 48 percent. This finding is notable because it represents a departure from reported patterns of discourse. Research has shown that teachers talk more frequently than students by a ratio of 3:2 (Flanders,1970).

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*Examples of the category "hold" or make a holding remark are "okay", "uh-huh", "I see what you mean."

Examination of reacting moves yielded particularly interesting results. It may be recalled that reactions are comments which are not directly elicited by a question and so are not conventionally "necessary" in discourse as, for example, responses to questions are. In previous studies in which the Bellack system was used, reactions were chiefly made by the teacher. This is not to suggest that reacting moves are usually the most common teacher-move. As might be expected, the solicitation or question is the most typical teacher move. In this study reactions were the favored move of both the teacher and the students. In fact, the students made slightly more reactions than the teacher indicating that they chose to participate in the discussions more often than they were obliged to. Teacher reactions are somewhat different from student reactions in that the former are more conventional in classroom discourse. That is, it is not uncommon for a teacher to comment on a student's response to a question whereas it is less likely that students would comment on a remark of a teacher or other students. Yet, this uncommon behavior occurred in the discussions, indicating that students' participation was more self-initiated than teacher-solicited.

The preponderance of teacher reactions demonstrates that the teacher moved the discussions along by reacting to students rather than by soliciting information from them. In fact, the categories of functional meaning, "to highlight", "recapitulate", "restate", "repeat" and "hold" developed to identigy the teacher's behavior. That is, a common practice of the teacher was, for example, to react to and restate what a student said. This behavior served to invite continued student participation as indicated by subsequent student reacting moves. It suggests that as teachers we might generate greater student engagement by asking fewer questions and listening more closely to students' comments. There is little research of the effects of non-questioning teacher behavior and the impact of teachers' comments on the flow and content of discourse. The notion that fewer direct questions generates more student participation has a parallel in therapeutic settings: a therapist stimulates patient participation not chiefly by direct questioning but rather by commenting non-judgmentally on the patient's comments (MacKinnon & Michels, 1971). Similarly, a teacher may foster student engagement by collaborating with them in discussions rather than by asking rapid fire questions. If one speculates about ways of contending with student passivity, it could be asserted that participation increases as students feel free to take risks in expressing thoughts.

While reacting moves were the teacher's preferred mode of expression, as might be expected she also asked questions and was the principal solicitor in discussions. The analysis system provides information about the number and types of questions asked. Twenty six percent of the teacher's questions were factual and 40 percent were questions seeking clarification. A preponderance of questions from the category "to clarify" suggests that the teacher's questions acted as probes to stimulate further student thinking. It would seem that her questions were affected by and related to what students had said rather than a series of rapid fire questions.

Implications for College Teaching

How applicable are findings in a laboratory school setting to the university classroom? It can be asserted that the ideas generated from this study need to be tested in more traditional school settings. This study took place in an educational environment in which the articulation of ideas is valued. The students while drawn from diverse socio-economic, racial and religious backgrounds are not truly representative of public school children since their parents chose to send them to a laboratory school. Yet these very elements, valuing the articulation of ideas and a diverse student body, are commonly thought to be found in a university setting. Thus the question of applicability may depend on the priorities of the university teacher.

If the college classroom is seen as an arena in which students should be actively engaged in learning by expressing and developing ideas related to an academic discipline, then the means of fostering such participation become worthy of consideration. If as college professors we are willing to take a look at our teaching behavior, we may find that in our zeal to impart knowledge we have paid more attention to what we have to say than to whether it is learned. This is not to suggest that we should spoon-feed our students or tailor our teaching to students' needs. Indeed, by the time they reach college, students should be responsible for their own learning. What is suggested here is that our goals of teaching as academic discipline may be more fully realized if we look at our teaching behaviors in light of these goals.

If we want to confront the issue of student passivity, we may have an opportunity in our classes during discussions. The analysis system developed in this study can be used as a staff development tool to provide teachers with information about classroom verbal behavior. It is difficult for teachers simultaneously to lead a discussion and be reflective about their verbal behavior. With objective data about verbal interactions in discussions, teachers could reflect on their behavior. The objective information could be provided by tape recording discussions and listening to discourse in light of category disctinctions. Categories could be collapsed to facilitate learning the system. Teachers could learn, for example, if they ask rapid fire questions or make reacting statements which invite participation. They could learn which substantive categories are used most in their classes. Is discourse confined to"informing" (fact-stating) or do "explaining" and "speculating" occur? Effects of reacting statements could be studied to note if, in fact, they do generate student participation.

The notion that we should look more critically at discourse is based upon the belief that student passivity is a troublesome phenomenon in college classes. To deal with this problem may mean considering new approaches to our work as college teachers. While the problem of passivity is scarcely of our making but rather has complex origins, this fact should not stop us from addressing the problem. Reasearch on teaching has occurred on less advanced educational levels than college. It is hoped that some of the findings about teaching in this laboratory school setting can be used as points of departure in looking at college teaching.

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INSTRUCTIONAL DESIGN APPLYING FUZZY DECISION

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1. Introduction

In order to investigate and modify the logical relations of the subject matters in the instructional programs, we have been studying the analysis method which provides the instructors with effective information to evaluate and refine the instructional programs.

It is convenient to use graphical representation when we analyze the logical relation of the subject matters. We verify the adequacy of the instructional structure, i.e.

(1) We analyze the logical structure of the subject matters and construct the logical structure graph L,

(2) We construct the test structure graph T by the test items attached to the logical nodes of the graph L,

(3) We execute the test and construct the test fuzzy graph $\underset{\sim}{F}$ by analyzing test data, [1], [2], [3], [5],

(4) We compare the graph $\underset{\sim}{F}$ with the graph T (or the graph L) and extract the difference between them,

(5) We analyze the causes of the difference from educational point of view and improve the instructional programs.

However, in step (4), it is difficult to compare the graph $\underset{\sim}{F}$ with the graph T, because $\underset{\sim}{F}$ is a fuzzy (i.e. multivalued) graph and T is a non-fuzzy (i.e. binary) graph. In order to solve the difficulty, applying fuzzy decision, we transform the fuzzy graph $\underset{\sim}{F}$ into a binary graph F_μ which is optimally similar to $\underset{\sim}{F}$. Moreover, we discuss the representative application to higher Mathematics. This analysis method is called Fuzzy

Relational [illegible] FRS Analysis), [9], [10].

For th[illegible] analys[illegible] [illegible]porting system CARAT (Computer-Assisted Retrieval an[illegible] [illegible]st items) has been cooperatively developed by Waseda Universi[illegible] [illegible] [illegible]niversity and Nippon Electric Co.Ltd., and practically utili[illegible] [illegible]s, [4], [8].

2. Definitions

Let $\underset{\sim}{F} = [\underset{\sim}{f}_{ij}]$ $(1 \leq i, j \leq n)$ be a fuzzy graph, i.e.

$$\underset{\sim}{F} = [\underset{\sim}{f}_{ij}] \qquad \begin{cases} 0 \leq \underset{\sim}{f}_{ij} \leq 1 & (i \neq j) \\ \underset{\sim}{f}_{ij} = 1 & (i = j) \end{cases} \qquad \text{.....(1)}$$

We will never need to consider loops, that is, we can assume, if we wish, that our fuzzy graph is reflexive.

Definition 1 (Flow of a fuzzy graph)

The flow of a fuzzy graph $\underset{\sim}{F}$ is denoted by F_μ, where μ is a threshold parameter between 0 and 1.

$$F_\mu = \left[f_{ij}\right] \qquad f_{ij} = \begin{cases} 1 & (\underset{\sim}{f}_{ij} \geq \mu) \\ 0 & (\underset{\sim}{f}_{ij} < \mu) \end{cases} \qquad \text{.....(2)}$$

Definition 2 (Inverse graph)

The inverse graph of a flow F is denoted by $\check{F}$.

$$\check{F} = \left[\check{f}_{ij}\right] \qquad \check{f}_{ij} = \begin{cases} 1 & (i = j) \\ 1 - f_{ij} & (i \neq j) \end{cases} \qquad \text{.....(3)}$$

Definition 3 (Distance between fuzzy graphs)

The distance between a fuzzy graph $\underset{\sim}{F}$ and its flow F is denoted by $\| F - \underset{\sim}{F} \|$.

$$\| F - \underset{\sim}{F} \| = \sum_{1 \leq i, j \leq n} | f_{ij} - \underset{\sim}{f}_{ij} | \qquad \text{.....(4)}$$

Definition 4 (Coincidence index, C-index)

The coincidence index on flows (C-index) between F and $\underset{\sim}{F}$ is denoted by $C(F, \underset{\sim}{F})$.

$$C(F, \underset{\sim}{F}) = \| F - \underset{\sim}{F} \| / \| F - \check{F} \| \qquad \text{.....(5)}$$

Remark:

The C-index $C(F,\underset{\sim}{F})$ has the value between 0 and 1.

$$0 \leq C(F,\underset{\sim}{F}) \leq 1 \qquad \text{.....(6)}$$

If $C(F,\underset{\sim}{F})$ is close to 1, the flows between F and $\underset{\sim}{F}$ is similar; $F \sim \underset{\sim}{F}$. Conversely, if closed to 0, the flows between $\check{F}$ and $\underset{\sim}{F}$ is similar; $\overline{F} \sim \underset{\sim}{F}$.

3. Fuzzy Decision of States

In order to evaluate the similarity between F and $\underset{\sim}{F}$, we could consider the fuzzy decision of a state. We assume here that one initial state x ($x=0$ or 1) becomes another state y ($0 \leq y \leq 1$) by certain cause. In order to measure the difference between the state x and y, we define the fuzzy set $\underset{\sim}{S}$ and $\underset{\sim}{E}$ in the following.

Definition 5 (Fuzzy set $\underset{\sim}{S}$, $\underset{\sim}{E}$)

If $x=0$, we define

(i) the fuzzy set $\underset{\sim}{S}$: the state y becomes inverse to x

$$m_{\underset{\sim}{S}}(y) \triangleq y \qquad \text{.....(7)}$$

(ii) the fuzzy set $\underset{\sim}{E}$: the state y becomes fuzzy, that is, we determine that y becomes neither similar nor inverse to x

$$m_{\underset{\sim}{E}}(y) \triangleq 1-|1-2y| \qquad \text{.....(8)}$$

and if $x=1$, instead of (7), we define $\underset{\sim}{S}$ nextly.

$$m_{\underset{\sim}{S}}(y) \triangleq 1-y \qquad \text{.....(9)}$$

For the fuzzy set $\underset{\sim}{S}$, the fuzzy set not $\underset{\sim}{S}$ and very $\underset{\sim}{S}$ are denoted by $\overline{\underset{\sim}{S}}$ and $\underset{\sim}{S}^2$, respectively. If $x=0$, we have the following fuzzy decisions, $\overline{\underset{\sim}{S}}^2 \wedge \underset{\sim}{E}$ and $\underset{\sim}{S}^2 \wedge \underset{\sim}{E}$.

The fuzzy decision $\overline{\underset{\sim}{S}}^2 \wedge \underset{\sim}{E}$: the state y is very similar to x

$$m_{\overline{\underset{\sim}{S}}^2 \wedge \underset{\sim}{E}}(y) = (1-y)^2 \wedge (1-|1-2y|) \qquad \text{.....(10)}$$

The fuzzy decision $\underset{\sim}{S}^2 \wedge \underset{\sim}{E}$: the state y is very inverse to x

$$m_{\underset{\sim}{S}^2 \wedge \underset{\sim}{E}}(y) = y^2 \wedge (1-|1-2y|) \qquad \text{.....(11)}$$

If $x=1$, instead of (10), (11), we have the following fuzzy decisions.

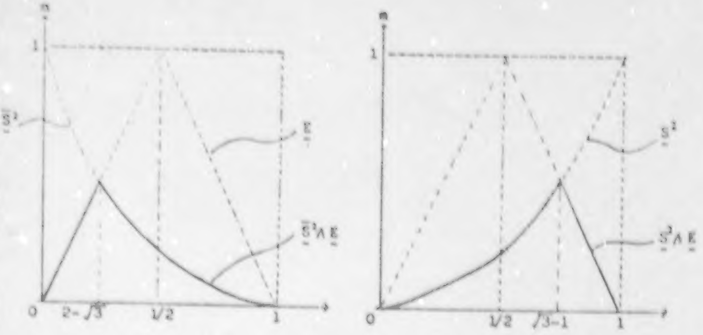


Fig.1 Fuzzy decision of state (x=0)

$$m_{\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}}(y)=y^2\wedge(1-|1-2y|) \qquad \text{.....(12)}$$

$$m_{\underset{\sim}{S}^2\wedge\underset{\sim}{E}}(y)=(1-y)^2\wedge(1-|1-2y|) \qquad \text{.....(13)}$$

The maximal decisions of $\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}$ and $\underset{\sim}{S}^2\wedge\underset{\sim}{E}$ are denoted by $\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}|_y$ and $\underset{\sim}{S}^2\wedge\underset{\sim}{E}|_y$. We have

$$\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}|_y=2-\sqrt{3},\quad \underset{\sim}{S}^2\wedge\underset{\sim}{E}|_y=\sqrt{3}-1 \quad (\text{if } x=0) \qquad \text{.....(14)}$$

$$\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}|_y=\sqrt{3}-1,\quad \underset{\sim}{S}^2\wedge\underset{\sim}{E}|_y=2-\sqrt{3} \quad (\text{if } x=1) \qquad \text{.....(15)}$$

Therefore, if $x=0$ and $0\leq y<2-\sqrt{3}$, then the state y is very similar to x, and if $x=0$ and $\sqrt{3}-1<y\leq 1$, then the state y is very inverse to x.

Theorem 1 (Determinative condition of state, D-condition)

The inverse state of x is denoted by $\check{x}$ i.e. $\check{x}=1-x$. We have the ranges where the state y is similar to the initial state x ($x\sim y$), y is inverse to x ($\check{x}\sim y$) as follows.

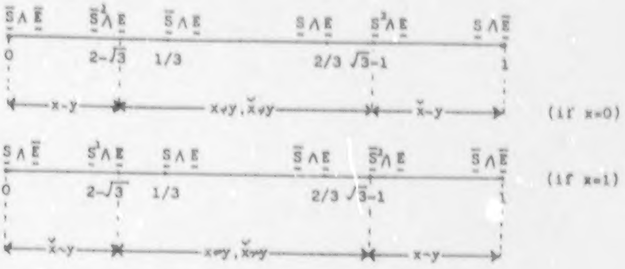

$\bar{\underset{\sim}{S}}\wedge\bar{\underset{\sim}{E}}$
$\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}$
$\bar{\underset{\sim}{S}}\wedge\underset{\sim}{E}$
$\underset{\sim}{S}\wedge\underset{\sim}{E}$
$\underset{\sim}{S}^2\wedge\underset{\sim}{E}$
$\underset{\sim}{S}\wedge\bar{\underset{\sim}{E}}$
0
$2-\sqrt{3}$
1/3
2/3
$\sqrt{3}-1$
1
$x\sim y$
$x\nsim y,\ \check{x}\nsim y$
$\check{x}\sim y$
(if x=0)
$\underset{\sim}{S}\wedge\bar{\underset{\sim}{E}}$
$\underset{\sim}{S}^2\wedge\underset{\sim}{E}$
$\underset{\sim}{S}\wedge\underset{\sim}{E}$
$\bar{\underset{\sim}{S}}\wedge\underset{\sim}{E}$
$\bar{\underset{\sim}{S}}^2\wedge\underset{\sim}{E}$
$\bar{\underset{\sim}{S}}\wedge\bar{\underset{\sim}{E}}$
(if x=1)
0
$2-\sqrt{3}$
1/3
2/3
$\sqrt{3}-1$
1
$\check{x}\sim y$
$x\nsim y,\ \check{x}\nsim y$
$x\sim y$

Fig.2 Determinative condition of state

4. Coincidence Curve on Flows

By the D-condition, we have the following theorem concerning the C-index.

Theorem 2

If $C(F,\underset{\sim}{F}) < 2-\sqrt{3}$, the flows between F and $\underset{\sim}{F}$ is similar, and if $C(F,\underset{\sim}{F}) > \sqrt{3}-1$, the flows between $\check{F}$ and $\underset{\sim}{F}$ is similar.

$$C(F,\underset{\sim}{F}) < 2-\sqrt{3} \Longrightarrow F \sim \underset{\sim}{F} \qquad \ldots\ldots(16)$$

$$C(F,\underset{\sim}{F}) > \sqrt{3}-1 \Longrightarrow F \sim \underset{\sim}{F} \qquad \ldots\ldots(17)$$

The value of the C-index $C(F_\mu,\underset{\sim}{F})$ changes depending on the threshold parameter μ $(0 \leq \mu \leq 1)$. Therefore, we present the function

$$C(\mu) = C(F_\mu,\underset{\sim}{F}) \qquad \ldots\ldots(18)$$

which draws the curve (coincidence curve on flows ; C-curve).

By the C-curve, we could visually obtain the interval $(\underline{\mu},\bar{\mu}]$ which gives the minimum value of $C(\mu)$.

Definition 6

If μ belongs to intervals $(\underline{\mu},\bar{\mu}]$ which give the minimum value of $C(\mu)$ and $F_\mu \sim \underset{\sim}{F}$, then the flows between F_μ and $\underset{\sim}{F}$ are called optimally similar $(F_\mu \approx \underset{\sim}{F})$.

An illustrative example is shown in figures, where a fuzzy graph $\underset{\sim}{F}$ and its C-curve $C(\mu)$ are given fig. 3 and fig. 4, respectively.

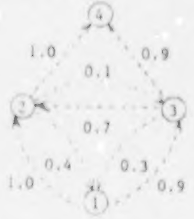


Fig. 3 Fuzzy Graph F

$F_\mu \sim \underset{\sim}{F}$ if μ is in (0.3, 0.7] and $F_\mu \approx \underset{\sim}{F}$ if μ is in (0.4, 0.7]. The flows of the graphs F_μ for $\mu = 0.4, 0.5, 0.6$ are illustratively shown in fig.5

If the graphs F_μ and $\underset{\sim}{F}$ are optimally similar $(F_\mu \approx \underset{\sim}{F})$, we could consider that F_μ reasonably represents $\underset{\sim}{F}$ on flows.

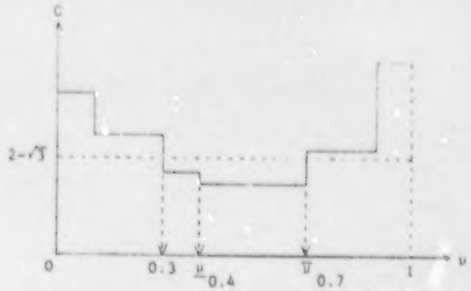
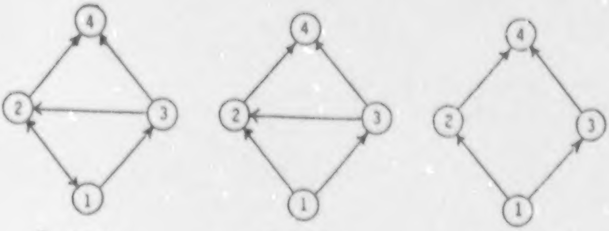


Fig.4 C-curve $C(F_{\mu}, \underset{\sim}{F})$



$F_{0.4} \sim \underset{\sim}{F}$ $F_{0.6} \approx \underset{\sim}{F}$ $F_{0.8} \nsim \underset{\sim}{F}$

Fig.5 Flows of $F_{0.4}$, $F_{0.6}$ and $F_{0.8}$

5. Case Study in Mathematics

We analyze the logical structure of instructional matters by investigating the prerequisite relations among logical nodes. A logical node N_i is prerequisite to the node N_j ($N_i \longrightarrow N_j$) if N_i is a necessary node to understand N_j.

We would verify whether the logical structure is adequate or not according to student performance scores.

We have already discussed the logical structure of Mathematics and FORTRAN [5], [6], [7].

According to the logical structure of the subject matters, we construct a logical structure graph. Nextly, in order to verify the adequacy of the logical structure by student performance scores, the test structure graph T is formed by the test items attached to logical nodes of the logical structure graph L.

We discuss a case study of the logical structure analysis concerning differential equation in higher Mathematics.

$$\sum_{i} a_i \frac{d^{n-i}y}{dx^{n-i}} = R(x) \qquad \ldots\ldots(19)$$

This equation has the following properties.

(a) Homogeneous type.

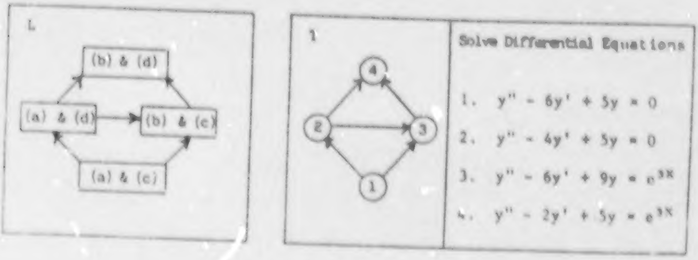
(b) Inhomogeneous type.

(c) Characteristic equation with real solutions.

(d) Characteristic equation with complex solutions.

Considering these four properties, we could construct the logical structure graph L as shown in fig.6.

According to this graph, we could construct the test structure graph T of four nodes shown in fig.6.



Solve Differential Equations

1. $y'' - 6y' + 5y = 0$
2. $y'' - 4y' + 5y = 0$
3. $y'' - 6y' + 9y = e^{3x}$
4. $y'' - 2y' + 5y = e^{3x}$

Fig.6 Graph L and T

We discuss the case study of the FRS analysis based on the test data obtained by 107 undergraduate students of the school of political science and economics in Waseda University.

We first construct the test fuzzy graph $\underset{\sim}{F}$ by analyzing test data, and secondly extract the binary graph F_μ which represents the global flows of the graph $\underset{\sim}{F}$ applying the fuzzy decision, and thirdly compare the graph F_μ with the graph T.

By the C-curve in fig.4, we could obtain the graph $F_{0.6}$ in fig.5 which is optimally similar to $\underset{\sim}{F}$ in fig.3.

Comparing the graph $F_{0.6}$ with the graph T in fig.6, we could obtain the following informations concerning the instructional structure of differential equation.

(1) The logical node $\sum a_i \frac{d^{n-i}y}{dx^{n-i}} = 0$ with real (complex) solutions is merely prerequisite to $\sum a_i \frac{d^{n-i}y}{dx^{n-i}} = e^{\alpha x}$ with real (complex) solutions, because the logical flow 1 → 3 (2 → 4) is maintained.

(2) We could recognize the lack of the fundamental knowledge of the students' concerning complex numbers, because the logical flow 2 → 3 disappears and 3 → 2 appears.

By means of these investigations, (a) we might teach the logical flow 1 → 3 firstly and 2 → 4 secondly, (b) it should be necessary to explain about complex numbers (especially the property of $e^{i\theta}$) before we teach the logical nodes 2 and 4.
In this way, we could modify and improve the instructional processes in the classroom.

6 Conclusion

We have presented the fundamental explanation of the FRS analysis and the verification of the adequacy of the logical structure. Although our case study is experimented in higher Mathematics, our analysis method supported by the CARAT system is available for arbitrary subjects.

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DESIGN AND DEVELOPMENT OF AN INSTRUCTIONAL STRATEGY

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INTRODUCTION

The intrest and motivation to consider designing and developing an instructional strategy was stimulated by the author's participation in two conferences[1], held in Dublin in 1979 and 1980, to discuss Engineering Manpower Development with particular reference to the needs of Irish industry during the next two decades. In the interval between the conferences the author also participated as a member of a sub-committee which worked to consider and prepare a submission on desirable changes in current third-level education programmes, so that they might satisfy the qualified manpower requirements for industrial and economic development.

During the first conference there had been substantial criticisms of the third-level education sector; the length of time taken to produce qualified personnel; inflexible tuition programmes; inappropriate skills and lack of work-experience. There was little new or unusual about these criticisms, they had also been made in other western countries[1-3]. However, several factors particular to Ireland, added a greater degree of concern to those involved in the third-level education sector.

These factors include, a rapidly expanding population, (currently the highest in western europe), a biased demographic pattern, (53% of population is under 27 years of age), rising levels of unemployment, diminishing numbers of taxpayers and a relatively high rate of domestic inflation. In addition education is one of Ireland's largest economic and social enterprises, in terms of resources deployed, participants and expenditure*. With respect to expenditure, almost 95% is from the taxpayer. Thus it is not suprising that the current Irish educational structures were discussed at length during the first conference and a sub-committee set up to consider the most urgent problems of the third-level education sector and to propose some practical solutions to the problems.

The problems identified included; a rapidly increasing demand for places in third-level colleges; no current programme to increase substantially the accomodation available; a moratorium on staff hiring; conservative and bureaucratic college administrations and teacher trades unions; lack of structured programmes for the professional development of instructors. A further set of problems related to the rapid penetration of 'New Technology' into the commercial and domestic markets. The effect of this technology on the educational sector could be guessed at, but it was agreed that it would be profoundly disturbing. It was against this background that the author decised to design and develop an instructional strategy which would be appropraite to this country's special needs.

PLANNING

The immediate requirement was to establish a suitable set of aims, objectives and criteria to guide the design and development phases. This was not difficult, as the terms of reference had already been established and the new instructional strategy had to have the following characteristics;

1. be suitable and appropriate to the Irish situation
2. be capable of interfacing with, and then replacing existing programmes of instruction
3. be effective, both with regard to cost and educational objectives

This latter characteristic gave the new instructional strategy its formal name, EFFECTIVE FORMAT INSTRUCTION, (EFI).

The priority criteria were; to provide an instructional strategy which could be conducted with resources readily available; to utilise existing accomodation more fully and to reduce the length of the existing tuition programmes. These criteria are directly relevant to three of the most pressing problems outlined above in the introduction. The resolution of these problems would involve;

1. minimising capital expenditure, (buildings and equipment)
2. modest increases in numbers of instructors
3. increasing student through-put

The resolution of this third item was considered particularly important, as current third-level educational programmes range from only 21 to 28 weeks per annum. It should be both practicle and feasible to have tuition for 42 weeks per annum using innovative and imaginative teaching programmes. That is, programmes which promote intellectual and manipulative skill development rather than knowledge acquisition.

Several important educational qualities were considered necessary for a successful instructional strategy.

1. It should be 'dateless'. It should be capable of being easily changed in response to a variety of demands.
2. It should be adaptable. It should be capable of being used in all existing programmes of instruction - regardless of subject or skill content.
3. It should be flexible. It should be capable of being used in programmes of varying duration and with different types of students.
4. It should be professionally stimulating. It should both intrest and motivate the instructor.

These qualities effectively fixed the direction of the development of the strategy. Development would start with complex ideas and these would have to be progressively simplified to obtain the minimum, effectively operating procedures.

Instructional strategies belong to the field of applied disciplines and as such they require a philosophical structuring. This is not a seperate theory of philosophy, but an amalgam of operational hypotheses. These hypotheses are selected on the basis of their perceived usefulness in developing reasonable and practical working practices. These practices would include the planning activity, design and development, monitoring and evaluation. The essential feature of the philosophical structuring is that it is 'exclusive'. Its usefulness is limited to the rejection of ideas which have failed under trial testing. The philosophical structuring of FFI was derived from a study of the writings of several authors[5-10].

DESIGN AND DEVELOPMENT

The design and development phases cannot be easily separated as they proceded together in a series of repeating patterns, concept - trial - result. Design and development are never actually completed, there is always a pattern of piece-meal modification. The proncipal aim of these latter modifications is to ensure an increase in effectiveness and a reduction in specialisation, (but not sophistication), of the programme of instruction.

The first part of the work involved reviewing the existing educational practices and procedures being operated at third-level. A survey was conducted of the science and engineering courses being offered in the four third-level colleges in Dublin; University College, Trinity College, Bolton Street College and Kevin Street College. A wide range of educational opportunity is offered by these colleges, Degree, Diploma and Certificate programmes; whole-time courses and block-release and part-time courses. The findings of the survey may be summarised as follows; (undergraduate courses only).

1. There was a direct correlation between duration of tuition and the nature, (type), of qualification being offered.

Table 1.1 Type of Course; Tuition Time (weeks); Chronological Duration of Course (months)

Whole-Time	Tuition Time	Chronological Duration
Degree	84 - 112	44
Diploma	84	33
Certificate	56	18

Table 1.2

Part-Time	Tuition Time	Chronological Duration
Diploma	60	57
Certificate	36	33

2. With respect to whole-time courses, there was a considerable disparity between the university colleges and the technologial colleges, in the number of formal tuition hours per week of a course.

Table 2. Type of College; Type of Course; Hours per Week Formal Tuition.

College	Degree Course	Diploma Course	Cert. Course
University	19 - 26	-	-
Technological	25 - 32	26 - 28	28 - 32

3. The formats of instruction were generally didactic and heavily structured. There was little innovative instructional practice. Student participation was passive rather than interactive.

4. Assessment and evaluation were almost exclusively end-of-session type. Emphasis was on essay-type written papers. Continuous assessment and project contributions were subsidiary to the formal written papers.

In order to obtain more objective information on educational practices a second survey was conducted, this time of courses being offered on a commercial demand basis by non-academic institutions and specialist business concerns. These courses were of short duration, had specific training objectives and did not lead directly to academic qualifications. The findings of this second survey may be summarised as follows;

1. The instructors were closely involved in all aspects of the programmes; planning, production, implementation and monitoring.

2. There was a strong bias in the educational objectives towards changing and developing attitude. There was less emphasis on knowledge acquisition. The role of the student was interactive.

3. Performance based assessments were used, and in addition questionnaires were used to evaluate both the course content and the performances of the instructors.

4. High quality and sophisticated instructional media were used extensively. The courses were rigorously costed.

Following these two surveys an in-depth review of the planning and design phases was undertaken. During the planning phase a philosophical structuring, derived from a literature study had been used to select a set of operational hypotheses, (or working models). These hypotheses were then used in the design phase to quide and direct the scope and content of the instructional strategy. The combined findings of the two surveys considerably altered the original concepts of how the strategy might be used. Activities, not initially considered, would now have to be elements of the complete structure of the strategy. These activities were combined planning and production and promotion. The new instructional strategy had to be a 'Total Educational Package'. A formal structure was now proposed, which would describe Effective Format Instruction as a single organisational concept, which was capable of sub-division, but not separation into four interconnected processes,

Survey and Design
Development and Production
Implementation and Monitoring
Promotion

The instructor is directly involved in each process, although his level of participation will vary.

The final part of the design and development phase was conducted while the author was involved in making television commercials. It has long been recognised that advertising, whatever about its ethics, is the pseudo-science of persuasion. Creating and stimulating demand. Moulding and changing opinion. These tasks have to be accomplished in a covertly agressive manner and extremely subtle and sophisticated techniques are used to achieve the desired results. There are also some unexpected outcomes . There is a ready appreciation among advertisers of the effectivness of different media in delivering information, the emphasis being on the choice of medium, the technicalities being secondary. Several persons with differing skills and technical competence, plan, design, execute and evaluate the finished presentation. Instructors using EFI would have to adopt the techniques used by skilled advertisers, be aware of the effectivness of different media and accept the need to cooperate together in the production of a programme of instruction.

The development phase of the work involved the production and testing under classroom conditions elements of two programmes of instruction.

1. A Set of Practical Excercises in Biochemistry
2. A Laboratory Safety Seminar

These were chosen as they were within the scope and competence of the author.

The practical excercise programme required 16 x 2½ hour class/laboratory periods. The course was conducted in 2 x 12 week block-releases, over 2 academic sessions. The Safety Seminar was scheduled to be conducted over two days at the commencement of the academic session.

The Practical Excercise Programme

A laboratory programme was already in operation but was proving unsatisfactory. It was decided to gradually introduce the new programme over 4 or 5 block-release groups, (2 - 3 academic sessions), and to closely monitor the impact of the new programme on student learning. The analytical methods used were substantially modified from the published procedures. Using only 7 different analytical procedures it was possible to develop the 16 separate excercises. The educational objectives concentrated on observing, recording, handling and graphical anaylses of laboratory data. To reduce the effect of the "answeritis syndrome", the students were given an indication of the type and order of result that should be obtained. The problem of the relationship of the laboratory manual to the student's own record book had to be resolved. The decision was taken to present the manual in 5 separate loose-leaf sections. The sections dealt with, procedures for creating tables and drawing graphs, statistical handling of data, a set of numerical excercises derived from the actual practical excercises and two sections containing the practical excercises, one for each year of the course. The loose-leaf sections were distributed as required. The practical excercises were not numbered so that they could be presented in any sequence chosen by the instructor. Several different typefaces were used in printing the manual to determine if one gave better comprehension. The students are required to enter their laboratory data and graphs directly into the manual, (a reporters notebook is used for rough work), and the manual may not be removed from the laboratory during the course. This latter restriction has led to a marked improvement in the students' work.

In addition a class register is kept by the instructor to record details of the analytical data and results obtained by each student and to record anecdotal information on the conduct of the class. The instructor prepares and keeps his own laboratory manual using the collated results from the class register. There are two complimentary manuals for use by the technical staff preparing the excercise and other instructors. One details the complete preparation details for each excercise, the second is an anecdotal record, complied by the instructor, on the conduct of each practical excercise. The purpose of this record is to try and maintain consistency in presentation and to provide a record of any difficulties or unexpected outcomes.

The tutorial component of the practical programme is still being developed. A library of 35 mm slides and A4 OHTs are being prepared and class-tested. Also in preparation are a series of videotaped presentations covering the use of laboratory instruments and basic analytical procedures. Those parts of the excercise programme in current use are subjected to evaluation by means of a course questionnaire. This is issued to the students during the 11th week of the course; it contains 26 individual questions covering 5 sections.

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The sections in the questionnaire are;

1. performance of the instructor
2. effectivness of media in presenting information
3. suitability and relevance of course content
4. suitability of the course presentation format
5. suitability of the assessment procedures

To date, two groups of students have been issued with the questionnaire, (68 responses out of a possible 79). The findings may be summarised very briefly as follows;

The majority of respondents, (over 65%) were;

1. satisfied with the performance of the instructor
2. satisfied with the quality of media used in presentations
3. di-satisfied with the course content - it was not directly relevant to the examination.
4. satisfied with the course format (practicals and tutorials)
5. very dis-satisfied with the assessment procedures - this is by written, end-of session examination. The instructor has no discretion to alter the examination procedures.

The Laboratory Safety Seminar

This seminar will be compulsory for all students attending practical excercises classes in the Biological Sciences Department of Kevin Street College. Its major educational objective will be to create a committed and positive attitude to laboratory safety. It will be presented by a team of three or four instructors. The involvement of the students will be highly interactive. There will be brief verbal presentations with 35 mm slides and 16 mm film visuals, and demonstrations. There will be several free discussion sessions where the students will be asked to express their views about laboratory safety. A set of suitable questionnaires is being prepared which it is hoped will establish the students' initial attitude to safety, any change in this attitude at the end of the seminar and a follow-up several months later.

SUMMARY

The development and use of an instructional strategy, at third-level, which would result in greater numbers of more skillful graduates would be of economic benefit to Ireland, especially if this increase in numbers could be achieved with a modest increase in expenditure. The production and implementation of such a programme of instruction presents many technical difficulties. The resolution of these difficulties requires the instructor to look beyond his own subject discipline and technical skills. There is a need to become involved and cooperate with, other instructors and media specialists. This concept of team cooperation among instructors and non-instructors is highly emotive. The system might work well in isolated local cases but its introduction on a substantial scale might have undesirable outcomes.

Third-level education in Ireland is under severe pressures, academic, social and economic. Changes in educational practices will have to be made. Realistic and acceptable replacement practices will have to be found, practices which are not perceived as a threat by instructors. The design and development work described in this paper demonstrates that it is possible to produce programmes of instruction which can be both cost and educationally effective. Few resources are needed, and the new programme may be easily interfaced with and then replace an

existing programme of instruction.

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